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Marine Engineering

What the Field Offers to the Young Man Seeking an Occupation

By J. C. Workman

LONG before school days are over the average young man reflects more or less seriously upon the line of employment he is to choose for his life work.

Perhaps from his early boyhood he has had a vague desire to become a statesman, soldier, lawyer or doctor. Or, seeing a locomotive with all its wonderful mechanism, the life of a railroad engineer has seemed attractive. But, at more mature age, say from 18 to 21, the problem becomes a serious one—very largely because of his limited personal knowledge of the kind of ability necessary for the work he is to choose, or the lack of assurance that he will find his choice satisfactory.

The young man is too often influenced by his anxious parents. "I don't know what I am going to make of my boy", is an expression familiar to us all.

The father may have a well established, profitable business, and his ambition to have his son succeed him is perfectly natural, but to insist upon his son doing this if his tastes and talents lie in another direction, is a great injustice to the boy. I know of a case in which the father is the head of a very large manufacturing concern and was particularly anxious for his son to take up the business he has made by his skillful and energetic leadership. However, after a college education, the son decided upon a professional career with its uncertainty from a financial standpoint, thus proving himself to be a young man of strong character.

A great engineer may have a son who would never be a success as an engineer, not necessarily from lack of intelligence, but because his tastes, habits or temperament might be entirely foreign to the requirements of this profession.

I have been referring to the average young man. Of course, there are those who are naturally born musicians like Beethoven, preachers like Henry Ward Beecher, or electricians like Edison or Marconi who are so abnormally developed in certain lines that they find their vocation as the magnetic needle finds the pole.

J. C. WORKMAN.

J. C. Workman, the author of this article, is chief engineer of the American Ship Building Co. He began work in the machine shop of the William Cramp Ship & Engine Co., better known as Cramps, at Philadelphia, 26 years ago. From gang foreman in the erecting shop for two years, he went into the drafting room of the engineering department. In 1897 he came to Cleveland to work on revenue cutters for the Globe Iron Works of which he was made chief draftsman a year later. When the American Ship Building Co. was formed in 1899, taking over several companies including the Globe Iron Works, he was made chief draftsman of the combination. In 1911 he was made its chief engineer. He obtained his technical education at Franklin Institute, Philadelphia. He is a member of the Cleveland Engineering Society.

I am also considering that the young man is choosing his future calling, not merely from a financial standpoint, but to discover the one for which he is peculiarly fitted, both by natural and temperamental qualifications. One, too, that will be most congenial, for there is hardly worse drudgery than to be compelled to perform a task for which you have no interest or liking and which is simply endured for the remuneration.

Frequently, however, and unfortunately, I believe, the money consideration has too great weight in the final decision that the young man makes. Of course, it looks very promising for the young college or high school graduate to start off with fifteen or twenty dollars per week; but we are reminded of the two apprentices who started at Baldwin Locomotive Works some 30 years ago. One would not work for the small sum then paid to boys learning the business, but started on a moderate wage turning car wheels. After 30 years he is still faithfully turning car wheels. The other lad was willing to begin at the bottom of the ladder, and has developed into a competent and well paid engineer.

The marine engineer of any ability is generally well paid, but if the young man, though he may possess the finest college education, expects large remuneration from the beginning, he will be disappointed in this profession. In either the engineering end of the business or in the hull construction branch, experience is a great asset.

The question as to whether a college education is essential in this branch of engineering has been very thoroughly discussed by Messrs. Carnegie and Crane. My own opinion, after some 26 years in the business, is that it all depends upon the man. However, the man with the college

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education will make more rapid progress than the man who, after his day's work is over, has to grind over his books with a tired brain. The company with which I am associated always shows a preference for college men, or at least boys with manual training experience.

However much experience the so-called self-made or practical man may possess, he is constantly compelled to consult the scientific or college man on many difficult and perplexing problems which can only be worked out by the technically trained mind.

Must Have a Mechanical Mind

The marine engineer must naturally have a mechanical mind. He should have an analytical mind and be able to reason out cause and effect. He should cultivate the power of observation and concentration and must possess a good memory. This is most essential. He must have courage, as often he will have to accept great responsibilities, involving large undertakings that may stand or fall, depending upon his engineering ability.

Often he is compelled to attempt new feats in engineering for which he can find no precedent or data in the text books, but must use his own ideas, based on common sense and experience. This reminds me that one of the most prominent marine engineers of the east once remarked: "Never let your engineering get away with your common sense. Engineering is only common sense."

From the crude little "Clermont" of 1807 called "Fulton's Folly", which took 32 hours to make the first trip up the Hudson from New York to Albany, to the great German liner Imperator, with her vice admiral, four captains, crew of 1,000 men in an enormous hull 918 ft. long, 98 ft. beam, 57,000 tons displacement on load draft, propelled by Parson's turbines of about 65,000 h. p., combining speed with the most luxurious appointments and conveniences for her passengers, is the progress of merchant marine.

From Perry's flagship, the Niagara, built of green lumber, with her primitive armament, to the 30,000-ton modern battleship, with her battery of 12-in. guns and protected by the best steel armor from 12 to 18 in. thick, is the story of the wonderful achievement of naval engineering of a century.

The young man who decides to take up marine engineering as a profession will find it most fascinating in either of its branches, hull design or propelling equipment and auxiliaries. So many beautiful engineering problems to work out and such a variety—no two jobs alike—all vessels designed to meet the special requirements under which they are to operate.

First, there is the fresh and salt water classification, the deep draft and light draft type, the latter in use on shallow lakes and rivers and usually of the side or stern-wheel types. These are seen on the Ohio and Mississippi rivers. Many of this type have been built in the United States for South America, such as the steamer Mamore. There have recently been built at Port Arthur on Lake Superior, two very fine steamers of this class, to ply on the Kootenay lakes of British Columbia. These boats run on a draft of 4 ft. 6 in. and make 22 miles an hour propelled by light tandem compound engines working under 200 lbs. pressure per square inch and developing 1,200 h. p. A unique feature in the construction of these boats is the fact that they were completely built at Port Arthur and then shipped in a knocked-down condition by rail to Nelson, B. C. The first of these steamers is the Nasookin, 227 ft. over all, 40 ft. beam, 8 ft. deep.

The stern wheeler lends itself particularly to shallow lakes or rivers because it can be so easily steered. Usually it has two rudders, and the flow of water from the wheel against the port or starboard rudder alternately causes the boat to come about very quickly.

Types of Ships

Before the type of a ship can be determined there are many preliminary investigations to be considered. The boat must be designed to especially meet the conditions of her trade. The owner or manager usually knows his own business and can be of great assistance to the naval architect or designer in deciding the best arrangements of cabins, cargo space, carrying capacity, draft, etc., and the most desirable machinery.

A good example is found in the new side-wheel steamer Seeandbee, of the Cleveland & Buffalo Transit Co., probably the largest vessel of her type in the world, as well as the most comfortable in her appointments. Before her plans were perfected months of conferences were necessary between the owners and ship builders. The many years' experience of the owners taught them just what was most essential in cabin space and convenience for this particular route from Cleveland to Buffalo. For instance, many people have asked why they build side-wheel steamers with inclined engines for this class of trade when a vertical marine engine could be built with less than half the weight and cost. There are several convincing answers to these queries.

First and most important, this boat has a night run, and has accommodations for sleeping 1,500 persons who go to bed for the purpose of obtaining a good night's rest. With the type of engine in the Seeandbee, which is an inclined compound engine of great weight and strength, developing 12,000 h. p. on about 30 revolutions per minute at a speed of 22 miles per hour and without any perceptible vibration, this result is obtained. A vertical marine engine with a high number of revolutions, though designed with the greatest care as regards balancing, invariably causes considerable vibration.

Advantage of Side-Wheel Type

Then the question of deck room gained by the side-wheel type is of enormous advantage, having great breadth over the guards, giving increased room on the freight deck and more space for state rooms and cabins.

The advantage of maneuvering, starting and stopping quickly, of steadiness in rough weather, is greater with a side-wheeler than a screw propeller. So it all works out pretty much for the comfort and safety of her passengers, and that is what the management endeavors to do.

The machinery of this steamer is particularly interesting to engineers, as it has some novel features in valve gear, such as the introduction of the Walschaert gear commonly seen on locomotives. This mechanism drives a Corliss gear for the two low-pressure engines with adjustable cut-off and the Poppet type valves on the high pressure. This arrangement, probably the first of its kind ever tried on a marine engine, has proven a complete success. This is an illustration of the above-mentioned necessity of the marine engineer undertaking new things.

The bulk freighter is designed with the view to carrying the greatest amount of cargo on a given draft. Her lines are not as graceful as a passenger boat or yacht. She is built to carry freight at a moderate rate, as it is not profitable to carry freight at express speed. The vessels of the freight class on the Great Lakes usually are limited to 11 miles loaded, and 12 to 13 miles light. Experience has demonstrated this to be the most economical point to operate.

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The experimental tank at Washington, D. C., has been of great assistance to shipbuilders in determining the exact power required to drive any particular model a certain speed on a certain horsepower. These models are usually made of wood carefully sand papered and varnished, an exact reproduction of the proposed vessel, and drawn through the water at different speeds, carefully noting the power required at each step. While we know that the resistance of a ship moving uniformly at any speed may vary as the square of that speed, the power to overcome that resistance and propel it at any speed varies as the cube of that speed. But so many elements enter into the calculations for speed, such as resistance due to skin friction, resistance due eddy making, resistance due to wave making, that it requires very experienced hands to calculate with nicety the required power without the use of the tank as a check on their calculations.

The yacht is in an entirely different class from either of the other types mentioned. It usually has very fine lines, and is designed for speed and for the comfort of the rich owner. She must be a thing of beauty and grace, cabins and interior finished in the rarest woods as expense is usually no object. The American shipbuilder finds so little profit in this line of work that he is well satisfied to allow his English brother to monopolize the business. One of the finest specimens of the naval architect's art is the new Winchester, with a speed of 32 knots, built by Yarrow & Co. for Peter Rouss, of New York. The aim of the engineer is to obtain the design of least weight consistent with the greatest strength. In other words, to give the greatest possible carrying capacity. It is with this end in view that the so-called Isherwood system of vessel construction has been introduced.

The Isherwood System

By the Isherwood system we mean the main framing of the vessel is longitudinal, or runs fore and aft, instead of transversely, thus insuring a lighter boat and a stronger construction longitudinally, besides having advantages from a shipbuilding standpoint. In the old method of construction, liners are necessary between the framing of the vessel and the plates, due to the lapping of same. These liners amount to about 2 per cent of the shell. A vessel constructed under the Isherwood system will weigh from 8 to 10 per cent lighter for the same strength than the transverse method, and enable her to carry more cargo on the same draft.

The successful engineer must design the engine so that metal is placed where it is most needed and of the best section to give greatest strength and lightness. As a rule, the marine engine is designed to stand greater stresses than a land engine. Often it means loss of the vessel to have a break-down occur at sea.

The United States government specifies a certain number of horsepower for each ton of machinery, in order to keep the installation as light as possible. This calls for the skill and ingenuity of the marine designer who, whether it is demanded or not, should use his material to the best advantage. To put more metal into a machine than is needed is poor designing. Of course, there is danger of going to the other extreme, and the factor of safety must be liberal.

Value of Observation

Then there is always the business side to be considered. Though an undertaking may be a complete engineering success, if the financial part is not satisfactory there is small credit for the engineering end. It may have failed through lack of proper supervision in the shop or on the field, or it may have been the designs were expensive from a machine shop point of view. A little more consideration in the drafting room might have saved the profit.

I have spoken of the great value of observation. Among the most prized possessions of engineers are their private note books. Text books and treatises are great helps to them, but the personal notes and sketches of good details, the results of personal experiences jotted down from time to time, also well tried formulas and results of tests that they have from their own knowledge secured and know can be depended upon, are of the greatest value.

The modern warship, ocean liner or first-class cargo steamer is becoming more and more a concentrated power station or great machine shop. The old-fashioned sailor is fast disappearing, sails and rigging are becoming a thing of the past. The comforts and luxuries of every sort demanded by the traveling public have made the ship more of an engineering problem than formerly.

The marine engineer must have a good idea of electrical engineering, as this equipment is becoming more and more of a necessity on shipboard, and is likely soon to be used on all auxiliary machinery. The electrical apparatus on warships and big liners is enormous—the cost of electrical equipment on one of our latest battleships was $300,000.

Ship ventilation is being widely used. The Seeandbee has the McCreery system and washes the air before forcing it through the saloons and all other parts of the ship. Ventilation has become a specialty in itself in marine engineering.

Refrigeration has become another important feature in the equipment of vessels. All passenger steamers and the better class of freighters have their own refrigerating plants. Refrigeration has revolutionized the method of carrying perishable foods such as beef and fruit. Steamers especially designed for this trade are marvels of engineering skill.

Sanitary and hydraulic engineering figure largely in the design of a modern passenger steamer.

The decorations and interior finish of an up-to-date liner afford a wonderful scope for the artistic ability of the naval architect.

The Diesel oil engine, or the internal combustion motor, has opened up a new and interesting field for the marine engineer. While so far not very much has been accomplished in this country, a great industry has been developed abroad, and a large fleet of Diesel-propelled vessels are in the commerce of the world. Tankers up to 15,000 tons displacement are being built with this type of motor, as well as some German warships. At present there are but two of any size being operated on the great lakes. The Calgary, of about 700 h. p., and the Fordonian, of 900 h. p. Both of these are foreign-built vessels and Canadian bottoms.

The Diesel Motor

The chief difficulty for the Diesel motor in the United States, where coal for marine purposes is so cheap, is the uncertain supply of crude oil or petroleum, which cannot at present be satisfactorily or regularly procured at a reasonable price. If this were not so, I can see no reason why this method of propulsion would not rapidly supercede the present steam engine, the principal advantage being economy in operation as regards the amount of fuel consumed which is only about four-tenths of a pound per horsepower, while the coal consumption is from 1½ to 2 lbs. A smaller engineering force, the weight and space gained by doing away with the boilers and coal bunkers, convenience of fueling, as it requires no trimming, the radius of steaming under one fueling, the saving of fuel while the vessel is in port and many

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other advantages that might be mentioned.

So the young man who thinks of undertaking either branch of the profession of marine engineering and ship building will find he has to have a good, broad education and a good general knowledge of the many branches of engineering.

I have always contended that the finished marine engineer could, with a little preparation, undertake most of the other branches such as civil, hydraulic, electric and others, because of the elasticity of mind required to meet the diversified problems that come up in many years' experience in the ship yard and shops.

The opportunities in this country for the marine engineer are many. If he wishes to follow the profession of a designer he will find ship yards of more or less importance on nearly all the rivers and lakes from Maine to California. If he wishes to follow the sea, there was probably never a greater demand for young men of education than now. On our own lakes good men are needed. The old type of engineer is fast becoming a thing of the past and our big steamship companies are looking for men of engineering education. They find it pays to have their investment in the hands of men who understand the theory of it all, as well as the practical end. Some of them have established winter classes for the betterment of their men.

The remuneration for this type of men is very good and exceeds the average office man by far.

In conclusion, let me emphasize the importance of having at least most of the qualifications that have been spoken of in this article. Unless you are a born engineer, you are not likely to be a success as I have been taught to measure success.

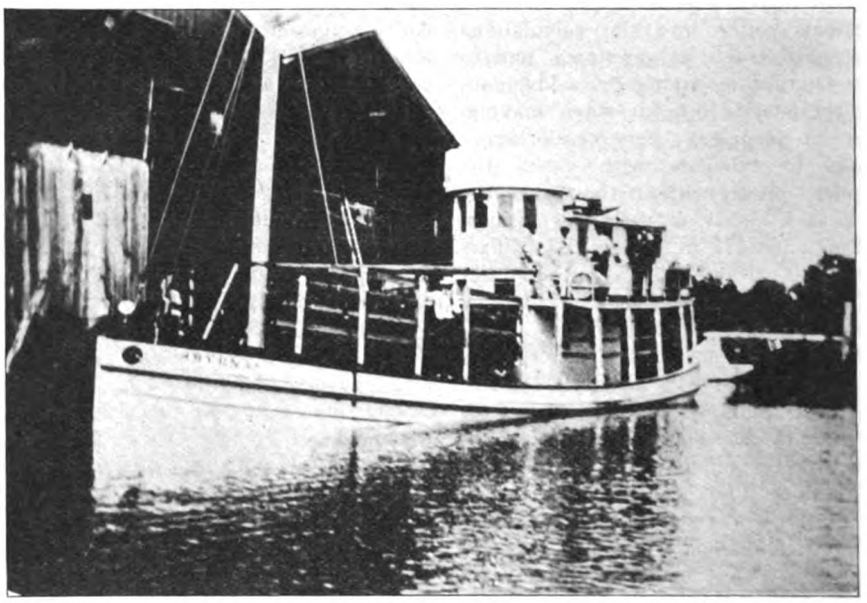
Producer Gas Freight Boat

The accompanying photograph is of the freight boat Smyrna, loaded with 75 tons of freight. This boat has been in active service night and day for an entire season. She is 65 ft. long and 19 ft. beam and runs between Smyrna, Del., and Philadelphia, Pa., and other neighboring ports.

Her power equipment consists of a 65-h. p. Wolverine engine and a marine gas producer, manufactured by A. L. Galusha & Co., of Boston, Mass. The fuel used is not kerosene or gasoline, but coal made into gas by the gas producer. The coal consumption is absurdly small, being not over one-quarter what the same powered steam engine would require.

The following general information is furnished by Engineer Laurie L. Wever:

"On keeping track of several of our regular runs from Smyrna, Del., to Philadelphia, Pa., I found that I could make the trip on 432 lbs. of coal, including lay-over to load and unload freight. The trip is 62 miles, and with a fair tide I could go in five hours and ten minutes, but with a head tide it took much longer, so I found that the average was 6½ hours, considering everything, with a coal consumption of 432 lbs., which is less than 1 lb. per horsepower hour.



THE FISHING TUG SMYRNA PROPELLED BY PRODUCER GAS

"This engine is a 65-h. p. and turns 240 r. p. m. when loaded down and 280 r. p. m. when light. I was also able to run with about 1,300 degrees temperature and maintain that regularly. I was never troubled with any "popping" of any kind (backfiring or misfiring of any kind), and it never occurred that the main gas ell on top of the gas producer got too hot to put my hand on it."

The coal used costs from $4 to $5 per ton, or the very small sum of about $1 per trip carrying 75 tons of freight 62 miles. The results check up closely with the results obtained by several fish boats and tow boats where fuel cost of producer gas is but one-tenth or even one-twelfth that of gasoline.

Charles N. Crowell, naval architect, Cambridge, Md., has been appointed general manager of the Prince Rupert ship repair and ship building plant of the Grand Trunk Pacific Railway Co. at Prince Rupert, B. C.

Air Pump Temperature Regulator

An interesting addition to the science of steam engineering is an air pump temperature regulator which has been fitted to the type of condenser known as the "Contraflo", made by the Messrs. Richardsons, Westgarth & Co., of Middlesbrough, Eng. In order to perceive the value of this development a few remarks on the theory of condensing as applied to marine practice may be advisable. Except in passenger boats of large power the standard practice on a steamship fitted with reciprocating engines is to withdraw air and water from the main condenser by a single air pump driven by levers from the main engines. In order to remove air from a condenser by an ordinary reciprocating air pump of the barrel and bucket type, it is fundamentally necessary for the temperature within the barrel to be less than the temperature within the condenser.

This will be seen when it is remembered that the temperature at which the water boils depends on the pressure to which it is exposed. At atmospheric pressure the boiling point is 212 deg. and at 28 in. vacuum it is 101 deg. and so on. If water at 101 degrees Fahr. were taken into an air pump it would be impossible to produce a greater vacuum than 28 in., as any attempt to do so will make the water boil and the barrel would fill with steam. Therefore, in such a case, the vacuum in the condenser must be less than 28 in. or else no air would flow from the condenser to the air pump. When the condenser and the air pump are equally hot the withdrawal of air is impos-

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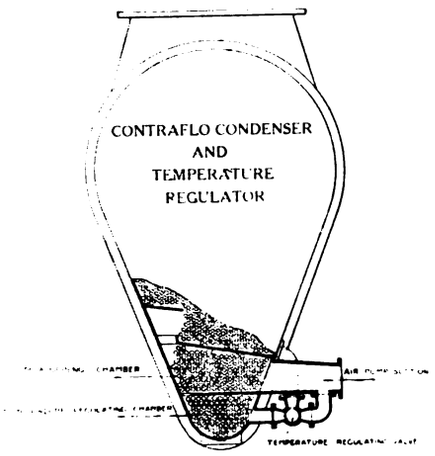
sible, however large the air pump may be, because the pressure in the condenser and in the pump are equal. If, however, the pump is made colder than the condenser the pressure in the pump falls and air flows into the pump. The greater the difference in temperature between the pump and the condenser the greater is the difference in pressure and the greater will be the quantity of air the pump can withdraw. Obviously, therefore, the withdrawal of air and water by



one pump introduces a compromise, for in order to withdraw air and allow the condenser to do its work effectively the air pump has to be relatively cold, but in order to obtain high thermal efficiency the temperature of the feed water must be relatively hot. In order to conserve heat the water passing through the air pump must be as hot as possible relatively to the temperature in the condenser.

In order to adjust these conditions as far as ever possible the air pump temperature regulator has been introduced, the actions of which will be seen from the illustration. The bottom of the condenser is provided with a divided off receiver which is always kept filled with condenser water. Above this receiver is a shallow chamber in which the air is devaporized as it flows towards the air pump suction pipe. The devaporizing chamber is divided from the condensing department by one or more diaphragms on to which the water of condensation falls and from which it passes either to the air pump or to the water charged receiver or partly to both. The flow of the water is regulated by a change valve and the inlet pipe of the receiver provides sufficient head to cause the water to circulate. If when the feed water passes direct from the condenser chamber to the air pump suction pipe the air pump is able to prevent any accumulation of the air in the condenser, then the air withdrawal capacity of the pump is obviously sufficient. If, however, the pump cannot prevent air accumulation in the condenser the vacuum falls. Under such circumstances the air withdrawing capacity of the pump can be immediately increased by lowering its temperature, and this can be effected by passing some water from the condensing chamber through the water charged receiver. In this way the air withdrawing capacity of the pump can be increased at will and a vacuum maintained in a way which would be impossible by any other means even if two ordinary sized pumps were fitted instead of one. It is temperature and not size, which controls the air withdrawing capacity of an air pump. For this reason a higher vacuum can be maintained in a steady manner in all seas when the temperature regulator is used in combination with a single air pump withdrawing both air and water than has hitherto been possible even with an air pump of abnormal size.

The great importance of maintaining a good vacuum under all conditions is so thoroughly understood by marine engineers that further stress need not be laid on the important nature of this development, which is of first class importance for any vessel where steaming economy has to be realized.

Obituary

Dr. S. J. P. Thearle, chief ship surveyor to Lloyds Register of British and Foreign Shipping, died on Nov. 14 at his residence, 74 St. Augustine's avenue, South Corydon, London.

Dr. Thearle, whose name was known all over the world as that of an authority on naval architecture, was born at Portsmouth in 1846. In 1860 he was apprenticed as a shipwright in Devonport Dockyard, where the late Sir William White, K. C. B., was also at that time learning his profession. In 1865 he was included among four students selected by the Admiralty to undergo a three years' course of study at the then newly formed Royal Naval School of Architecture. At the conclusion of this course he was granted the diploma of Fellow and appointed dockyard draughtsman. In 1872 he became draughtsman at the Admiralty, and in 1876 he offered himself as a candidate for a surveyorship in the service of Lloyds Register. To this he was duly elected, and he served successively in London, Bristol, Greenock and Glasgow. He served at Greenock from 1883 till 1887, and at Glasgow from 1887 till 1897, so that he spent about 14 years in the Clyde district. In 1898 he was appointed principal surveyor at Newcastle. In 1900 he was transferred to London as assistant to the chief ship surveyor, to which position H. J. Cornish had then succeeded. Dr. Thearle was appointed successor to Mr. Cornish when the latter gentleman retired in 1909, and he was the society's chief ship surveyor from that date until his death.

Dr. Thearle was the author of five valuable books on naval architecture. The earliest was an elementary treatise on "Laying Off Wood and Iron Ships". It was published in 1873. The latest was "Thearle's Modern Practice of Shipbuilding in Iron and Steel". It was originally published in 1887, and was rewritten recently. These works have always been recognized as standard text books at the various schools of naval architecture and by the royal dockyards and the board of trade. Another of Dr. Thearle's better known volumes was "Theoretical Naval Architecture", which was published in 1876.

In 1893 the committee of Lloyds selected Dr. Thearle to accompany Mr. Cornish on a visit to the Great Lakes of North America for the purpose of conducting investigations into the shipbuilding industry in that district, and reporting thereon for their information.

Dr. Thearle was a very familiar figure at all gatherings of shipbuilders and marine engineers, particularly at meetings of the Institution of Naval Architects, the North-East Coast Institution of Engineers and Shipbuilders, and kindred bodies. He read papers frequently on technical subjects at these meetings, and his contributions in this way to the literature of shipbuilding were of considerable importance. He read a paper on "Some Cases of Fatigue in the Steel Material of Steamers" at the summer meeting of the Institution of Naval Architects and the Institution of Engineers and Shipbuilders in Scotland in Glasgow this year, and took a leading part in the other proceedings. He was a member of the council of the Institution of Naval Architects and a vice president. He was a member of the present departmental committees on bulkheads and watertight compartments, and of that on the load line, and he had accepted an invitation to deliver the next James Watt anniversary lecture at Greenock. In 1910 he received the honorary degree of doctor of science from the University of Durham.

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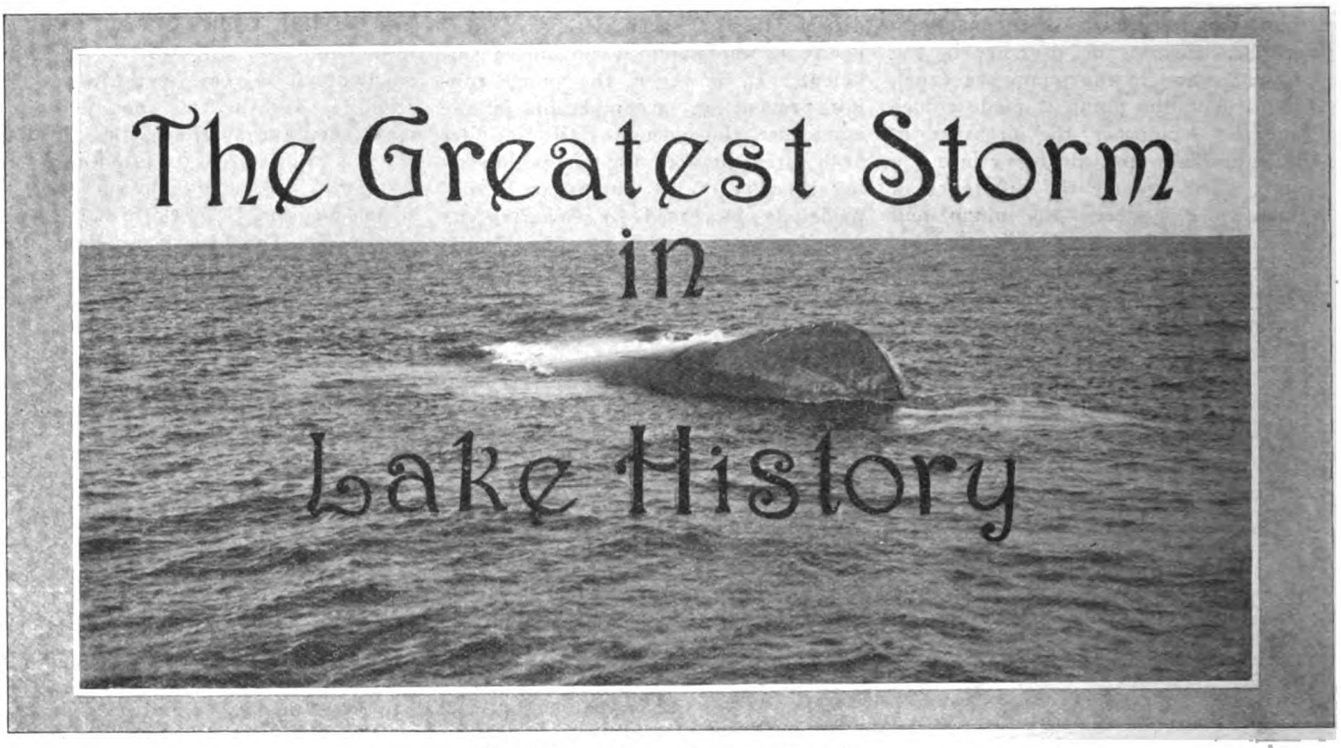
The Greatest Storm in Lake History



The Ship That Turned Turtle

THE storm which enveloped the Great Lakes region Nov. 8 to 11 was the most destructive since the lakes have been commercially navigated and will doubtless mark a period in the history of the lakes. There have been great storms in the past, notably that of 1905, but none so extended in area, so terrific in force and so long continued without any cessation of wind velocity. The storm really began on Friday night, Nov. 7, striking Lake Superior from the northwest. It was accompanied by a blinding snow storm, which made navigation practically impossible without great risk. The maximum velocity of the wind at the west end of Lake Superior on Saturday, Nov. 9, was at the rate of 68 miles an hour, with a heavy sea running. The sea ran pretty high all day Saturday and vessels remained in port. Those that were out sought shelter.

The First Casualty

The first casualty reported was that of the old wooden steamer Louisiana, belonging to the Thompson Steamship Co., of Cleveland, which ran ashore on Washington Island, Lake Michigan, at 2 o'clock Saturday morning, and almost immediately thereafter caught fire, becoming a total loss. The crew managed to reach the island in safety in the small boats.

On Sunday the storm struck Lake Huron and tore across the Canadian peninsula to Lake Erie with incredible velocity, doing much havoc. Telephone and telegraph wires and all avenues of communication for a hundred miles around Cleveland were entirely destroyed. For the better part of two days vessel owners did not really know what had happened to their ships, as it was utterly impossible to get a wire through anywhere. The first information into Cleveland came by wireless after the aerials had been replaced.

The early fragmentary information portended that something awful had happened and gradually as avenues of communication were opened it became known that the most appalling disaster in history had been visited upon lake shipping. For a whole week thereafter lake navigation was either suspended or conducted in the most desultory fashion, so dazed was everyone by the heavy blow.

The first intimation received of the unusual character of the storm was a wireless report that a vessel was floating upside down about 11 miles northeast of Fort Gratiot light, Lake Huron. This was a most mysterious circumstance, not generally credited, but subsequently developments proved it to be true. For several days the black overturned hull apparently floated transfixed in the one spot until it sank altogether out of sight. Then as quiet weather succeeded and the days went by and several stanch modern ships did not reach port, it became certain that the storm had taken a toll, the like of which has never been experienced before. Ten vessels had totally disappeared, six had been thrown up on the beach, becoming total losses, fifteen had been driven ashore, entailing heavy damage, and many others had to go to the ship yards to have their rivets tightened, so badly were they sprung by being pounded in the heavy seas.

The storm inflicted its heaviest damage on Lake Huron, though it apparently did not reach that lake until about noon, Sunday, blowing generally from the north and inclining somewhat to northeast.

Never Know What Happened

It will never be known what happened on board eight of the ships that were out in the storm on Lake Huron, because all of them foundered and not a life was saved. The experience of the steamer H. M. Hanna Jr., which was thrown upon a reef near Port Austin light, must have been typical of the experience of all. The Hanna passed Port Huron about 5 o'clock, Sunday morning, the weather being fair and clear, with a 15-mile breeze off the land and a low barometer. She passed Harbor Beach about 11:30 a. m., the wind increasing meanwhile. The vessel passed Point Aux Barques about 2 p. m., and as the wind increased, she was hauled more to the northward to hold her head to the wind. As the day advanced the snow got thicker and thicker, and the wind and sea so increased that the vessel began dropping off her course. Tremendous seas began to break over her, demolishing her after cabin, carrying away the starboard life boat and tearing off the top of the pilot house.

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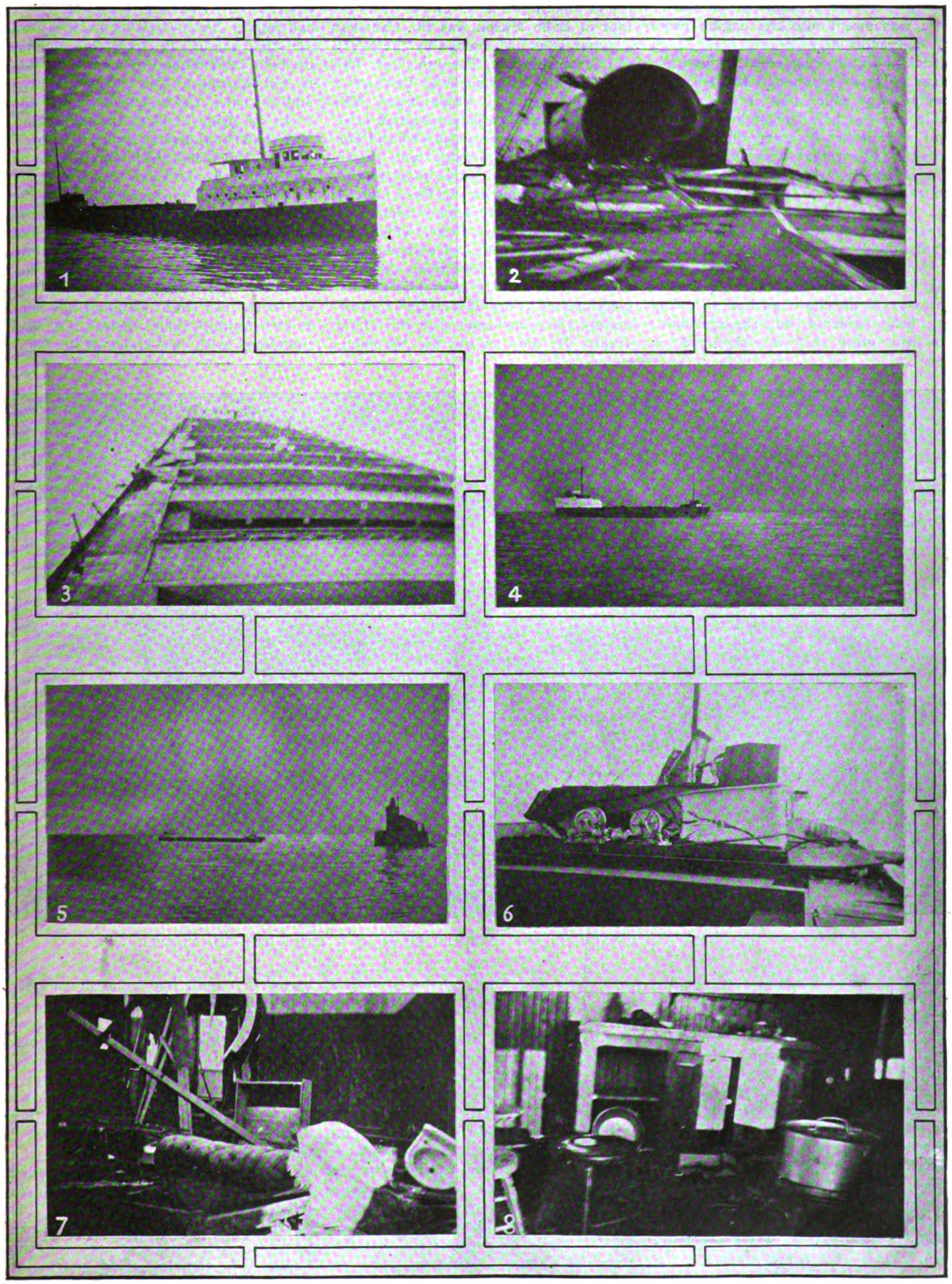
Photographs of the H. M. Hanna Jr.



1—THE H. M. HANNA JR. ON PORT AUSTIN REEF; 2—AFTER QUARTERS DEMOLISHED; 3—ALL HER HATCHES STRIPPED; 4—SHOWING THE HANNA ON THE ROCKS; 5—THE HANNA STRUCK ABOUT 900 FT. OFF PORT AUSTIN LIGHT; 6—ANOTHER VIEW OF CABINS AFT; 7—THE OWNERS' ROOM FORWARD; 8—THE GALLEY

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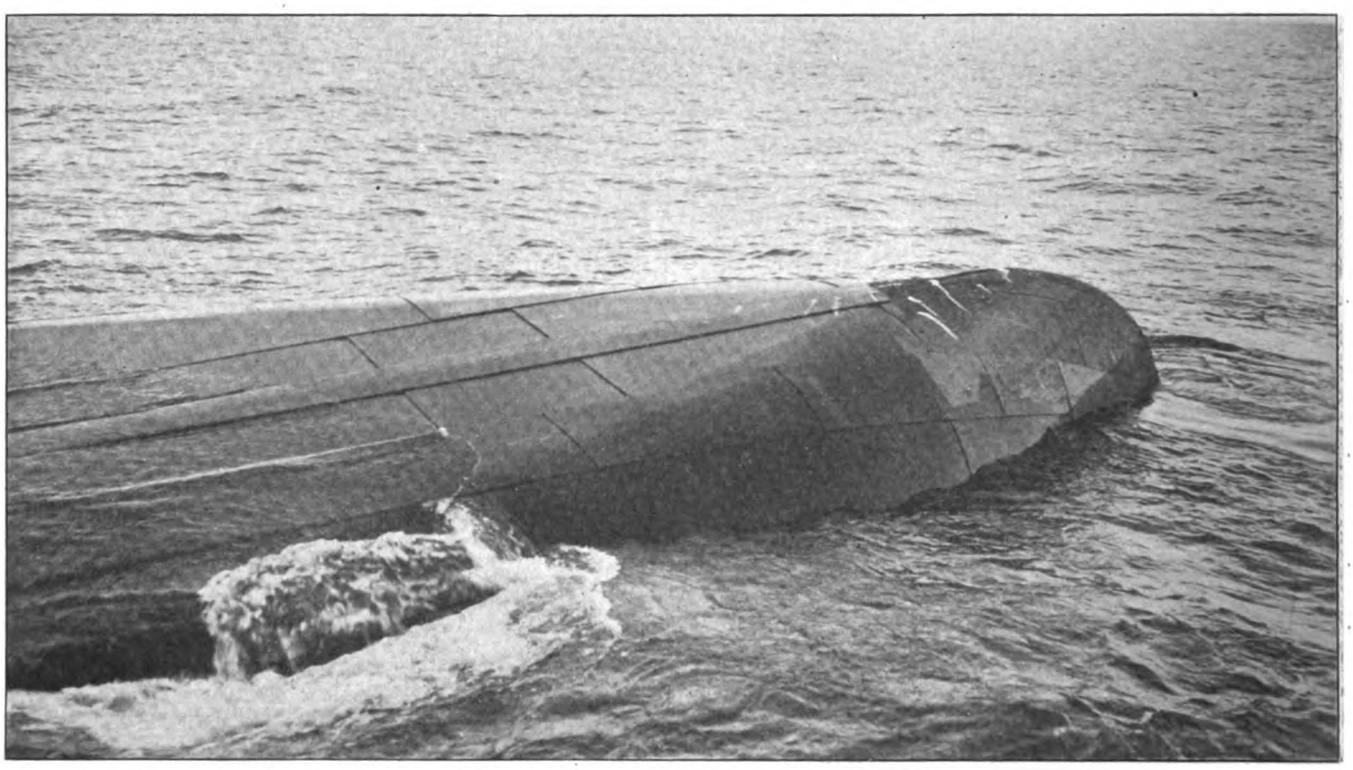
About 8 o'clock at night the steward's wife was swept into the engine room by a particularly heavy sea, which struck the after quarters. Though the steamer was in good trim and her engine kept wide open, it was impossible to keep her headed into the sea and she gradually went off into the trough. From that time on she wallowed heavily, with the seas breaking continuously over her, demolishing the crew's quarters aft and pouring tons of water into the engine room. Pumps and siphons were kept going to free her, and when the captain saw the Port Austin light close aboard, he threw out the port anchor to bring her head to wind, but she continued to drift until she was slammed up on the reef, where she was pounded so badly that she broke in two. All her hatches were torn from her and her rivets sheared off the top sides as if they had been cut with chisel and hammer. The crew remained aboard the ship all day Monday, but the sea moderating on Tuesday morning, they were enabled to lower the port life boat and reach the shore. The balance of the crew were taken off by the life savers. Everybody aboard spoke in the highest praise of Mrs. Black, the cook, who floundered about in the galley in water waist-deep, trying to prepare meals for members of the crew. The Hanna was abandoned as a total constructive loss.

It was at first thought that the ship found floating upside down near the foot of Lake Huron was the Canadian steamer Wexford, owned by the Western Steamship Co., Toronto, Ont. This steamer was built by Wm. Doxford & Sons, Sunderland, England, in 1883, and was of Canadian canal size. Doubts were expressed as to the correctness of her identity and certain evidence tended to prove that she was the steamer Charles S. Price, of the Hanna fleet. Divers later corroborated this evidence. The Price, which was built in 1910, was loaded with coal and was in seaworthy condition. She and the Isaac M. Scott, also loaded with coal, passed Port Huron at approximately the same time that the H. M. Hanna Jr. did. While the barometer was low, and high northwest winds were scheduled, there was nothing to indicate either in the sea or the wind at that time that the passage could not be made with reasonable safety.

The first intimations of further disaster usually came in the form of life boats or life rafts washing ashore. Vessel owners would hug the delusion that they had merely been swept overboard in the seas until the bodies of members of the crew also came ashore and then hope would be definitely abandoned. From these dire tidings it finally became certain that the steamers James Carruthers, John A. McGean, Argus (formerly the L. Woodruff), Hydrus (formerly the R. E. Schuck), the Wexford, Regina, Charles S. Price and Isaac M. Scott had totally disappeared on Lake Huron and that the H. B. Smith had foundered on Lake Superior somewhere between Marquette and the Sault. In addition, the Leafield had struck the rocks on Angus Island, Lake Superior, and had foundered in deep water. The L. C. Waldo had run ashore on Manitou Island, Lake Superior, becoming a total constructive loss. The Turret Chief had been driven ashore on Copper Harbor, Lake Superior, and the Matoa had gone ashore on Pointe Aux Barques, Lake Huron, both becoming total losses. Lightship 82 had been torn from her moorings near Point Abino, Lake Erie, and had foundered with her crew of six. The barge Plymouth had gone down near Gull Island, Lake Superior, with her crew of seven. No such widespread disaster ever struck the lakes before.



A VERY GRAPHIC PHOTOGRAPH OF THE STEAMER CHARLES S. PRICE TURNED TURTLE

The most appalling thing, however, was the fearful loss of life. Twelve vessels had foundered, taking down every member of the crew, amounting to 241 souls. Adding to that the three who lost their lives in endeavoring to reach shore from the stranded steamer Nottingham, the total death toll is 244.

Every effort was made by the Lake Carriers' Association to recover the bodies. A complete land patrol of the shores of Lake Huron and Lake Superior was organized, while revenue cutters scoured the lakes, and as soon

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as a body was recovered and identified it was expressed home. Meanwhile a disaster fund was started and contributions were immediate, so that within a few days over $75,000 was pledged for the relief of the bereaved families.

During the natural excitement that prevailed after the results of the great storm became definitely known, considerable criticism was leveled against the warnings issued by the weather bureau. There is no sound reason, however, for criticizing the weather bureau, as it had sent out its customary storm warnings, and there is no reason to believe that the bureau could have foreseen the unprecedented situation which existed in Lake Huron. The storm sprang up in that lake with great suddenness and violence and while its direction was generally from the northwest on other lakes, it appears to have struck Lake Huron from a north or northeasterly direction, apparently changing direction suddenly as the wind was frequently blowing one way while the sea was running another way. Masters of vessels that lived through it all testified that it was the worst storm in their experience and that their ships were never pounded so before. Heavy seas were constantly breaking over the vessels. Vessels coming down the lakes were continually boarded by following seas which tore away the after quarters or kept them constantly flooded to a depth of several feet, sweeping everything portable overboard. Considerable water also found its way by this means into the engine room. Vessels heading into the sea stood in danger of carrying away their pilot houses, and it was absolutely impossible to go either forward or aft on any of them, owing to the heavy seas continually breaking over the vessels.

As usual, there was much criticism from uninformed sources concerning owners who sent their boats out in such perilous weather. As a matter of fact, no owner gives sailing orders to his master. The navigation of the ship is left entirely to the master's judgment and it is neither expected nor desired of him that he should put out if weather conditions are unfavorable for safe navigation. No language could be plainer than the following, which is taken from a fleet circular letter issued last September:

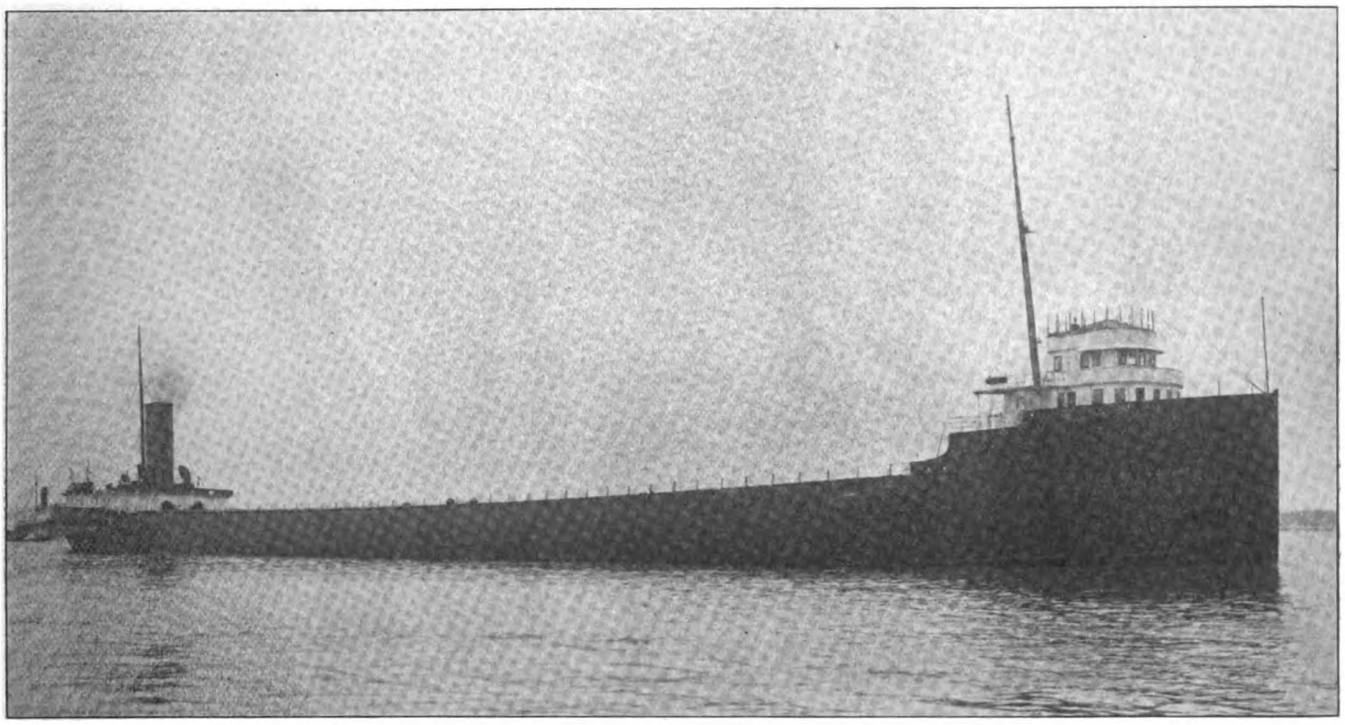
"Do not overload your vessel. See to it that you always have an abundance of fuel on board. Be careful that your hatches are properly secured and your ship is seaworthy before leaving port, even though you might suffer some delay doing so. Remember, I am relying upon your judgment as to when to seek shelter.

"The safety of the lives and property entrusted to your care must be your first consideration. See that you have oil bags and a supply of sea oil on hand for fall weather.

"I want to caution the masters of all our vessels, particularly the smaller steamers and barges, not to overload them. Keep your boat at all times so that she will have plenty of buoyancy for the fall gales."

Similar instructions are practically issued to the masters by all of the leading companies on the Great Lakes. The heavy loss of life and property was undoubtedly due to the unprecedented character of the storm.

All sorts of theories are advanced as to the cause of so many vessels foundering, but obviously everything is as yet conjecture. The vessels destroyed represented not only the best of lake practice, but of English and Scotch yards as well. Three of the vessels were British-built and while the Regina was constructed after the lake model, the Wexford and Leafield were typical British tramps, designed to go anywhere in the world. There is this point to be considered, that so violent a storm is not usually so prolonged. It was cyclonic in character with an average velocity of 60 miles an hour, accompanied by frequent spurts, in which the wind reached a maximum of 79 miles an hour. This condition continued well over 12 hours, whipping up tremendous seas, such probably as have never been encountered on the lakes. One theory is that the vessels were gradually blown into the trough and that they rolled so heavily as to capsize through shifting of cargo. Another theory is that water may have got into the hold through the hatches or sufficient admitted through sprung rivets as to cause the vessels to finally fill and founder. As all of the casualties on



THE STEAMER JAMES CARRUTHERS, WHICH FOUNDERED IN LAKE HURON. THIS SPLENDID STEAMER WAS BUILT DURING THE PRESENT YEAR AT THE YARD OF THE COLLINGWOOD SHIP BUILDING CO., COLLINGWOOD, ONT.

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Lake Huron occurred in a very congested area, and as no one could see through the blinding snow, there is a possibility that one or more vessels may have been in collision. One thing alone is known and that is that one of the ships actually turned turtle. How she came to turn absolutely upside down will no doubt be debated in marine circles for many years to come. If her cargo shifted in rolling and she took in water, one would naturally think that she would settle on her beam's end; if she took in water through sprung rivets, she would probably founder, sinking stern first. How she remained afloat upside down as long as she did is also a topic of discussion in many quarters. The theory generally credited is that her stern rested on the bottom and that the forward part of her was kept afloat by the buoyancy of her tanks and she settled gradually as the air

Capt. Hagen's Statement

I am master of the steamer Howard M. Hanna Jr., and have been master of lake vessels for about 25 years and have been in the employ of Capt. Richardson's fleet for 12 years as master of different vessels.

We left Lorain, bound for Fort William, Ont., on Saturday, Nov. 8, 1913, at about ten o'clock a. m., loaded with 9,120 tons of soft coal, and with a full complement of officers and crew, 25 men, including myself. We were drawing 18 ft. 9 in. forward and 19 ft. 2 in. aft. We had taken on fuel at Lorain and had about 325 tons of coal for our fuel bunker and we had plenty of fuel to make the round trip, and with provisions enough to last at least 20 days as we did not want to get any provisions at Fort William, and so we took enough to make the round trip. On leaving, the vessel was in ideal trim for encountering heavy weather. The cargo had been loaded so that it was up flush with the hatch coamings, with the exception of 6, 7 and 9, and the way the cargo had been loaded there was no chance of cargo shifting. The hatches had been battened down and we had tarpaulins with hatch bars and windy youngs; the bars were placed three athwartships on each hatch and three windy youngs fore and aft on each hatch, and everything was secured. Everything movable had proper lashings and the vessel was as staunch and seaworthy as possible. Upon getting out into Lake Huron the weather was good, the wind was west of north, maybe a 15-mile breeze off the land. We passed Fort Gratiot lightship at 5:12 a. m., of Nov. 9. The weather continued fair and clear until after passing Harbor Beach, but had shifted, first S. E. for a few minutes, then N. E., then N. N. E., and then continued about that direction with increasing velocity. We passed Harbor Beach at about 11:30 a. m., but at this time the wind was increasing gradually from a N. N. E. direction. Up until three o'clock there had been slight flurries of snow, but nothing unusual. At three o'clock it began to snow heavily so we couldn't see more than a mile or two and the wind was N. N. E. and increasing.

We passed Point Aux Barques somewhere about 2 p. m., and about 5 miles off Point Aux Barques, our compass course being N. x W. ¼ W. We had changed our course at Harbor Beach to this and as the wind increased we had hauled more to the northward to hold her head to the wind.

Between 7 and 8 p. m., with it snowing so we couldn't see the land and could not tell just where we were and could not tell just how fast we were going, but we were possibly 15 miles above Point Aux Barques. The wind and sea had increased so that the vessel began dropping off her course, although the engines were being worked at full speed ahead. Tremendous seas were coming over our bow and our starboard quarter and over the whole vessel in fact, and the seas had carried away part of our after cabin and had broken in our pilot house window and had torn off the top of the pilot house.

Then shortly after 8 o'clock she dropped off so that she came around into the trough of the sea. We had been taking seas over us right along and we had been using our siphons and pumps, but we knew she was taking in water by the way the pumps worked. After she got into the trough of the sea she commenced to roll and tumble and the seas were washing over her, and on account of throwing her propeller wheel out of the water and losing her headway it became impossible for us to bring her back so as to head into the sea or to keep her off before the sea, although we made every effort to do so that was possible. We lay in the trough of the sea, rolling heavily, with the sea washing over.

Shortly before 10 o'clock we could see Port Austin light and the bearing of the light was nearly S. W. off our port bow and as we saw that we were pretty close to Port Austin reef I ordered the first mate to drop our anchors and the first mate went down into the windlass room and let go the port anchor in order to try to bring her head to the wind. She didn't come up only about a point and in a very short time, about 10 o'clock p. m., she drifted broadside onto Port Austin reef, and as she lay on the rocks she was headed N. W. x W., and the light was bearing S. W. The port side fetched up on the rocks first and the seas and wind pounded her until the vessel went up onto the reef, leaving a list to starboard of about a foot, and in a very short time she filled with water. The water was right up to the deck and the hatches were all washed off.

After we went on the forward crew all came up into the texas to get shelter and remained there until about 2 p. m. the afternoon of the 10th. The after crew all remained aft in the mess room and kitchen, and after we fetched up we had no communication with the other end of the boat until Monday forenoon, when the weather moderated somewhat and the third engineer worked his way forward with food. In the afternoon the weather had moderated so that the forward crew were able to get aft and we all went aft and remained there with the after crew in the kitchen and mess room until Tuesday morning, Nov. 11. After daylight the mate went up on the after cabin with some of the crew and they cleared the ice and water out of the port lifeboat, and at about 7:30 they got the lifeboat lowered, and the two mates, two wheelsmen, boatswain, third engineer, two firemen and a watchman got the boat away and started for shore to procure assistance for the rest of the crew. They got ashore and landed on the beach near Port Austin. By the time our lifeboat got ashore the life saving crew started out and got to our boat about 10 o'clock.

When we left the vessel was broken in two about the after side of No. 7 hatch; you could see the crack across the deck and down the side. The smokestack was gone; also the life rafts and the starboard lifeboat had been washed away, and she had about a foot to a foot and a half starboard list, with her bows probably 6 to 7 feet lower than her stern, and half of the fuel hatch and the boiler house had been carried away; also the starboard side of the cabin and the after end of the cabin, leaving just the kitchen and the mess room and the hard coal box. The houses forward were all stove in, the windows and doors knocked off, the top of the pilot house gone, the bulwarks forward were all driven in, and, in my opinion, the vessel is a total loss.

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escaped from them.

The steamer John A. McGean was last seen about ten o'clock Sunday morning some distance north of Tawas Point on the direct Detour course. The Scott was following a few miles behind the McGean. With a lee shore both vessels were comparatively secure from a northwest gale on this course. It was about an hour after this that the northeast gale struck Lake Huron and undoubtedly both the McGean and the Scott headed into it. What happened to them after that is the merest guesswork. Capt. Charles L. Hutchinson thinks that the McGean may have run on the nine-fathom bank which is a shoal in the middle of Lake Huron, where fishermen say there is only 21 ft. of water. Vessels taking a generally northeasterly course from the point at which the McGean and Scott must have turned might possibly strike this shoal. If one of them did, of course, with the tremendous seas running it would be broken to pieces at once.

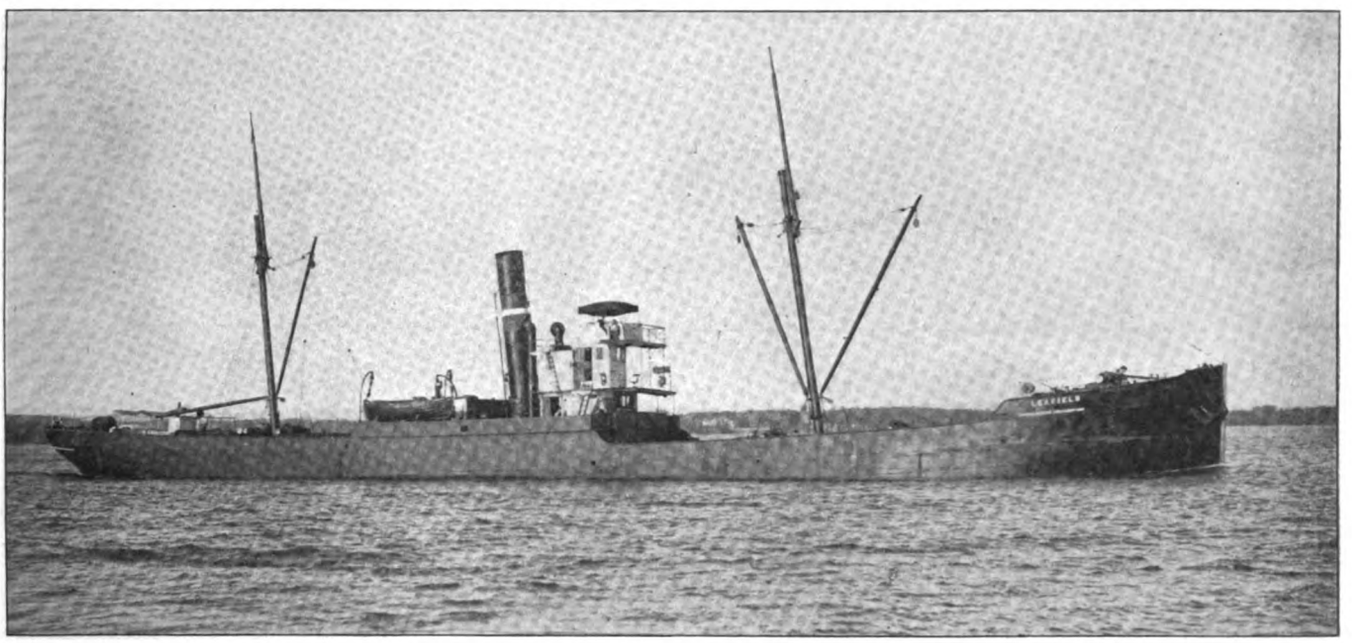
One of the great mysteries is the disappearance of the bulk freighter James Carruthers. This steamer was built at the Collingwood yard during the present year and was one of the best constructed vessels on the Great Lakes. She had several hundred tons more steel worked into her hull than is usual and for that reason her carrying capacity was greatly diminished, the owners sacrificing earning power for stanchness and seaworthiness. The Carruthers left the Sault downbound at approximately the same time that the J. H. Sheadle did and both entered Lake Huron within an hour of each other; yet the Sheadle came through after a trying experience, but the Carruthers has not been heard from since. What happened to her is the merest conjecture. The most plausible theory is that she got into the trough and that her cargo of wheat shifted, causing her to sink. She represents the greatest single loss, as she was insured for $409,000 and her cargo of grain was insured for $350,000.

The steamer J. H. Sheadle locked down at 8:30 o'clock Saturday evening, Nov. 8, being preceded by the James Carruthers and followed by the Hydrus. The Sheadle passed out of St. Mary's river into Lake Huron at 1:53 A. M. Nov. 9, with the wind light N. NE. This must have been approximately the time that the Carruthers and the Hydrus also entered the lake. After passing Thunder bay a strong N. NE. wind developed and the Sheadle shifted her course owing to the sea getting uncomfortable and continued to shift from a half to a point in order to keep running practically dead before it.

Capt. Lyons says that he got his regular soundings at Pointe aux Barques. It was snowing a blinding blizzard at the time, making it impossible to see anything. At Harbor Beach the deep sea soundings showed that the Sheadle was three miles outside of the wide course line. The wind was then due north and the Sheadle was running dead before the wind and sea. At 5:45 P. M. she shipped an enormous sea over the stern, smashing in the after windows and sweeping all the provisions out of the refrigerator, doing considerable damage to the interior of the cabin and fixtures. Capt. Lyons says that it was blowing about 70 miles an hour at the time, and that the sea was about 35 ft. high, one wave following another very closely. This was the testimony of other captains, that two or three waves would follow each other in rapid succession. The seas did not lengthen as they usually do when the wind increases in the ordinary way.

The wind velocity of this particular storm increased rapidly from 25 to 70 miles an hour, and the Sheadle was continuously pounded by following seas. The table had just been set for supper when the first sea struck her. The supper was washed off the table and the dishes piled up and smashed. Some of the fit-out of the private dining room was washed into the mess room. The steward's trunk was washed out of his room and stood up on end in the galley, and from that time on there was from four to six ft. of water continuously in the after cabins. The only dry place for the after crew was in the engine room, where they remained all night. At times volumes of water poured down into the engine room through the upper skylights.

Capt. Lyons continued on his course, using the lead constantly, and at nine o'clock at night had soundings of 18 fathoms carrying him well off to the west shore. He then called up the engineer and told him that at ten o'clock he was going to turn the ship around and wanted him to increase the speed of the ship up to that time so as to enable him to bring her around head to. At ten o'clock the



THE BRITISH-BUILT STEAMER LEAFIELD WHICH STRUCK THE ROCKS ON ANGUS ISLAND AND FOUNDERED IN DEEP WATER WITH ALL ON BOARD. THE LEAFIELD WAS BUILT BY WOOD, SKINNER & CO., NEWCASTLE, ENG.

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Sheadle turned. It took her about ten minutes to do so. She rolled heavily, but came around all right head to. Capt. Lyons then ran back on a N. ½ E. course for 6¾ hours, following the soundings back from 10 to 22 fathoms. About 4:15 on the morning of the 10th he turned again. This time the ship remained longer in the trough of the sea than she did the first time, on account of not getting so much way and running head into it, but she behaved very well, though rolling frightfully. While the steamer was coming about, Capt. Lyons braced himself by holding onto the handles of the hand-steering wheel. He was not only lifted from off his feet, but his whole body assumed a practically horizontal position. In returning the speed of the steamer was decreased from full to 55 turns, as the Sheadle got closer down to the river. Meanwhile the wind had gone to the northwest and the sea began to go down. The Sheadle passed within a thousand ft. of the hull of the Price. Just before she arrived abreast of the hull the deep sea lead was cast and registered 10 fathoms. Shortly after that it began to snow heavily and the Sheadle let go her anchor.

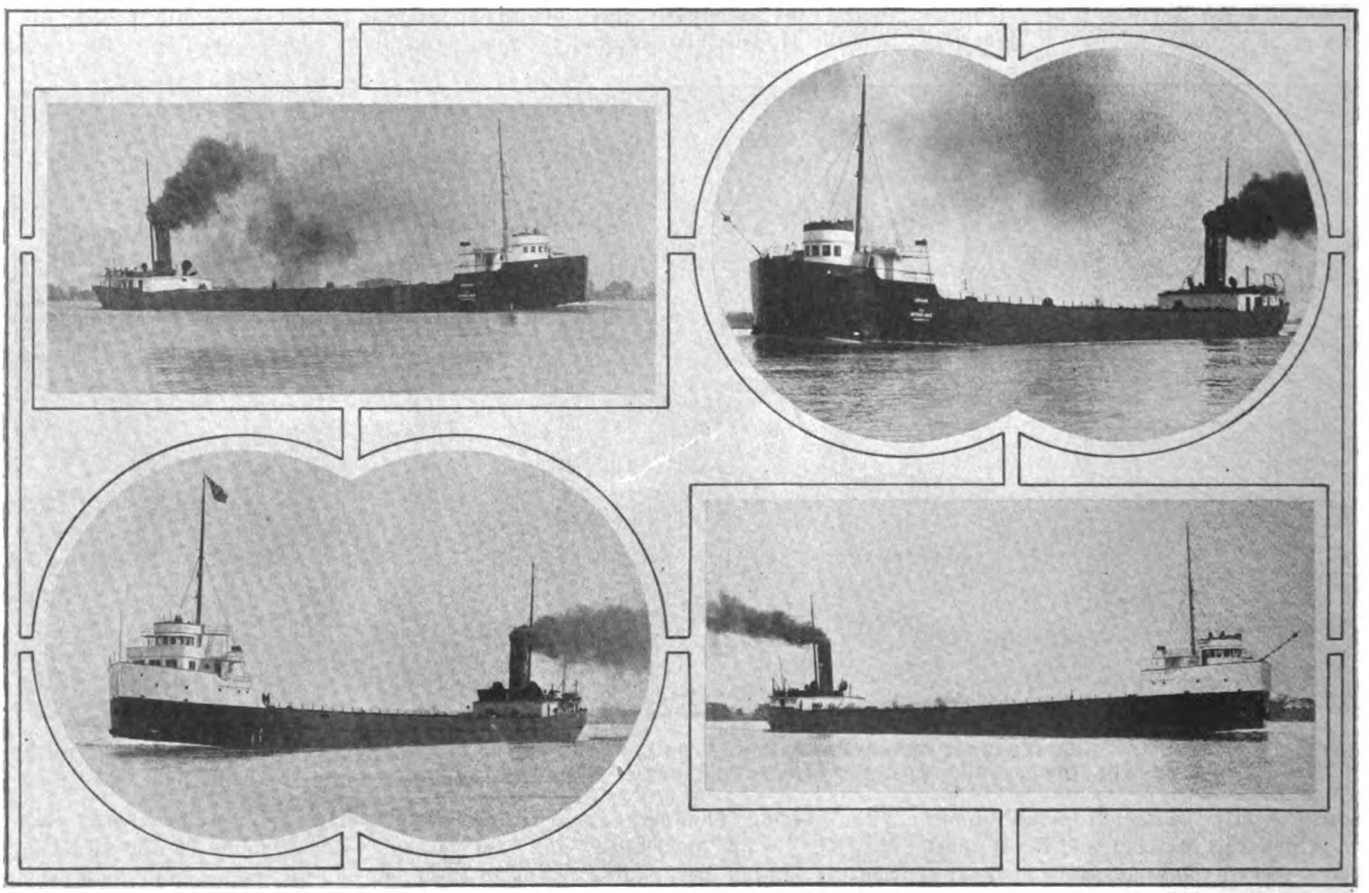
Capt. Lyons pays a very good tribute to the deep sea lead. "The use of the deep sea lead," he said, "was a great comfort to me. I knew where I was all the time. Having the familiar soundings right along through it all was the only thing that kept us from being wrecked. The soundings were familiar and gave us confidence. We use the machine constantly and the men are accustomed to it, but it was great punishment on them keeping it going."

Capt. Lyons says that in running with the sea he accomplished the distance in two hours that took 6½ hours in bucking it. He says the 70-mile gale lasted from about ten o'clock Sunday morning until about two o'clock Monday morning, or 16 hours with continuous snow. It will probably cost about $18,000 to repair the damage to the Sheadle caused by the pounding of the sea.

The steamer Matoa, of the Pittsburgh Steamship Co.'s fleet, went ashore at Point Aux Barques, Lake Huron, after a terrible struggle with the storm. Her cabins were demolished and her engine room filled with water. Captain W. W. Smith, marine superintendent for the company, after an examination, abandoned her as a total loss.

The Corsica Shoal lightship was torn from her moorings and fetched up two miles east and two miles south of her station. This occurred on Sunday, but the keeper of the lightship would not assume the reponsibility of returning it to her station until orders had been received from the lighthouse district at Chicago the next day with the result that the steamer Matthew Andrews went on Corsica Shoal.

Vessels That Have Totally Disappeared



HYDRUS
JOHN A. McGEAN

ARGUS
ISAAC M. SCOTT

A further instance of how things should not be done was afforded by the captain of the revenue cutter Morrell, leaving the wreck of the Price upon orders from Washington to go to the assistance of the G. J. Grammer, ashore at Lorain. The Price was directly in the track of vessels and a positive menace to navigation, whereas the Grammer was resting upon a sandy bottom and could not possibly injure herself or anything else and was in no need of assistance from any revenue cutter. When President Livingstone, of the Lake Carriers' As-

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sociation, learned of this maneuver, he dispatched the tug Sarnia City to the relief of the Price.

The steamer L. C. Waldo, owned by the Roby Transportation Co., of Detroit, went ashore at Manitou Island, Lake Superior, after having lost her steering wheel, which was carried away in the heavy seas striking the pilot house. All the members of her crew were saved, but they had an especially trying time, having been for more than three days without food and practically without shelter, as the seas were going over the bow constantly. The Waldo broke in two when she struck. The steamer George coming down from Two Harbors with ore when the wind shifted to a north gale. At 11:30 there was a heavy sea, which smashed the forecastle and laid the whole forward part of the boat open. We tried to turn around, but could not. The hatches were carried away and the boat was running before the wind. At 4 o'clock the following morning we hit Gull rock reef, going on hard. The water was continually breaking over her, threatening to tear her to pieces."

The steamer Turret Chief, owned by the Canadian Lake & Ocean Navigation Co., was driven high on the beach at the extreme point off Keweenaw, north of Copper Harbor, Lake Superior, and was badly pounded, though the wreckers are endeavoring to get her this fall.

The steamer William Nottingham, of the Great Lakes Steamship Co.'s fleet, went ashore between Sand and Parisian Islands, Lake Superior, and was very badly damaged. Her grain cargo, insured for $200,000, was a total loss. After several days of labor, the wreckers succeeded in releasing the Nottingham and she was taken to Toledo for repairs.

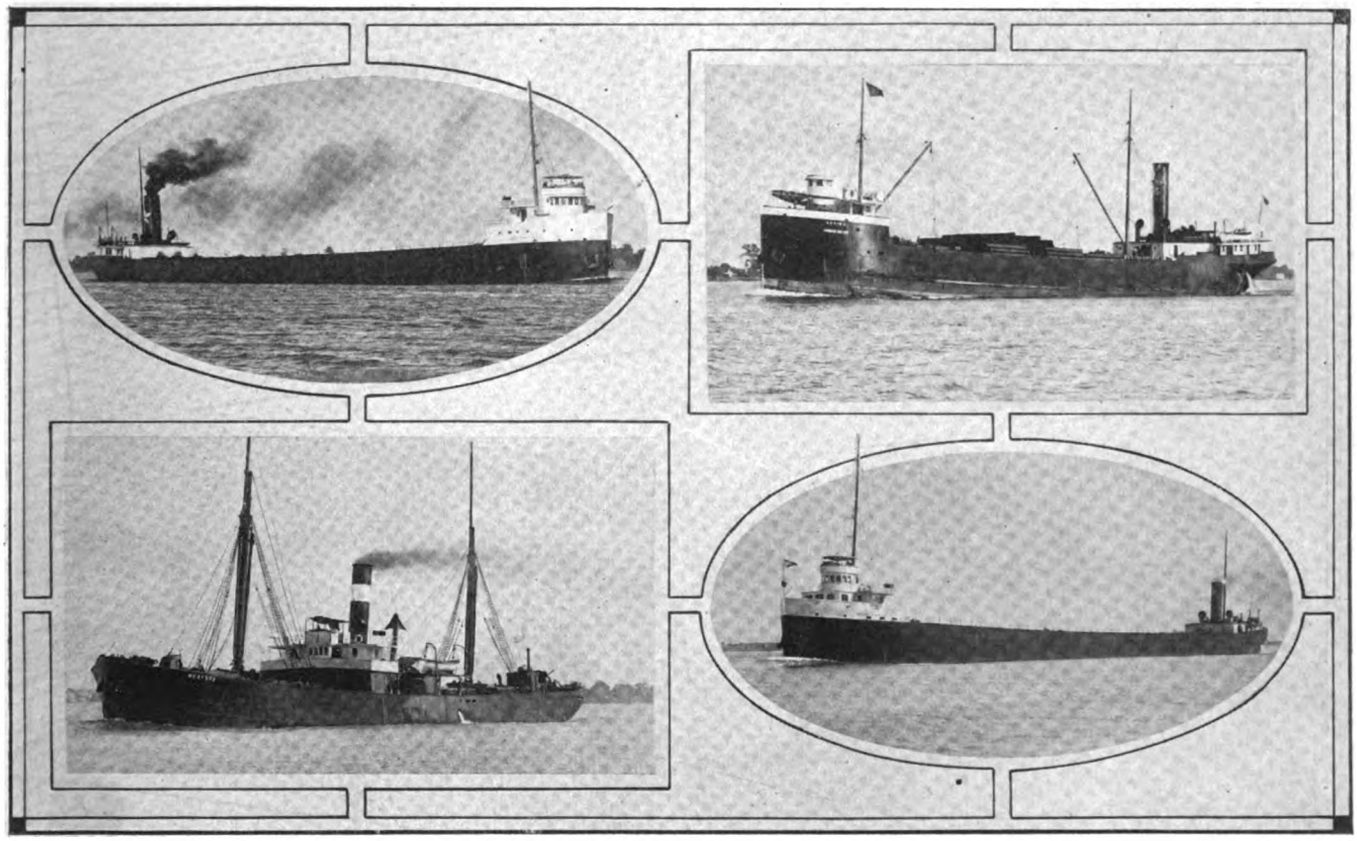
The steamer H. B. Hawgood, of the Acme Steamship Co.'s fleet, upbound without cargo, went ashore in the snow storm about two miles above Point Edward, Lake Superior, but was later released without much damage.

The steamer W. G. Pollock, of the Valley Steamship Co.'s fleet, went aground just below the St. Clair ship canal, having taken a sheer into the east bank.

The steamer G. J. Grammer went aground half a mile east of the harbor mouth at Lorain on Sunday, Nov. 9, but was released a few days later.

The steamer F. G. Hartwell, of the Tomlinson fleet, struck about a mile southeast of Iroquois light, Lake Superior, and sank in 26 ft. of water.

Vessels That Have Totally Disappeared



THE CHARLES S. PRICE
THE WEXFORD

THE REGINA
THE H. B. SMITH

Stephenson, of the Pittsburgh Steamship Co.'s fleet, stood by the Waldo for a whole day. Captain A. C. Mosher, of the Stephenson, finally succeeded in launching a life boat and sent one of his mates ashore with a picked crew to get the life savers from Eagle Harbor to take off the crew of the Waldo.

It was the women again, Mrs. Arthur Rice, the steward's wife, and Mrs. Mackey, his mother, who cheered the crew during their trying experiences.

"It was about nine p. m., Nov. 7, when we first ran into the storm," said Captain Duddleson. "We were

She was floated after her cargo of ore had been lightered.

The steamer Cornell, of the Pittsburgh Steamship Co.'s fleet, had a terrible time keeping off the beach at Crisp Point, Lake Superior. She had both anchors out and her engines going full spead ahead to keep her from going ashore. This was on Saturday, Nov. 8. On Sunday morning the wind moderated and the Cornell put out, only to be caught in the gale later in the day. She was light, but the seas mounted her fantail and smashed in her after quarters. It was impossible to get from forward to aft,

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the crew being without anything to eat for a couple of days. The height of the waters can be appreciated when it is known that the Cornell, being light, her fantail must have been above 30 ft. above the surface of the water.

The steamer J. T. Hutchinson, of the Pioneer Steamship Co.'s fleet, went aground at Point Iroquois, Lake Superior, and sustained heavy damage. She was later released, however, and taken to Lorain for repairs.

The steamer Pontiac, of the Cleveland-Cliffs Iron Co.'s fleet, en route from Lake Michigan light to Marquette, ran on Simmon's Reef, Straits of Mackinaw. As her tanks were leaking, she was forced to abandon her trip and to return to Lake Erie for repairs.

The steamer Peter White, of the Cleveland-Cliffs Iron Co.'s fleet, bound to Marquette light, was caught in the gale on Lake Superior and lost 45 of her wooden hatch covers through springing of the boat. They were all battered to pieces, floating around in the loose water in the hold. The White succeeded in making the lee of Grand Island and remained there until the worst of the storm was over.

The passenger steamer Huronic, of the Northern Navigation Co.'s fleet, went ashore on Whitefish Point, and was badly pounded for three days.

The steamer J. M. Jenks, of the Hawgood fleet, went ashore at Midland, Ont., and had to lighter part of her grain cargo before she could be released.

The steamer A. E. Stewart, owned by the Stewart Transportation Co., Detroit, went ashore in Whitefish Bay.

The steamer D. O. Mills, of the Interlake Steamship Co.'s fleet, went ashore at Harbor Beach, Lake Huron, but released herself without damage.

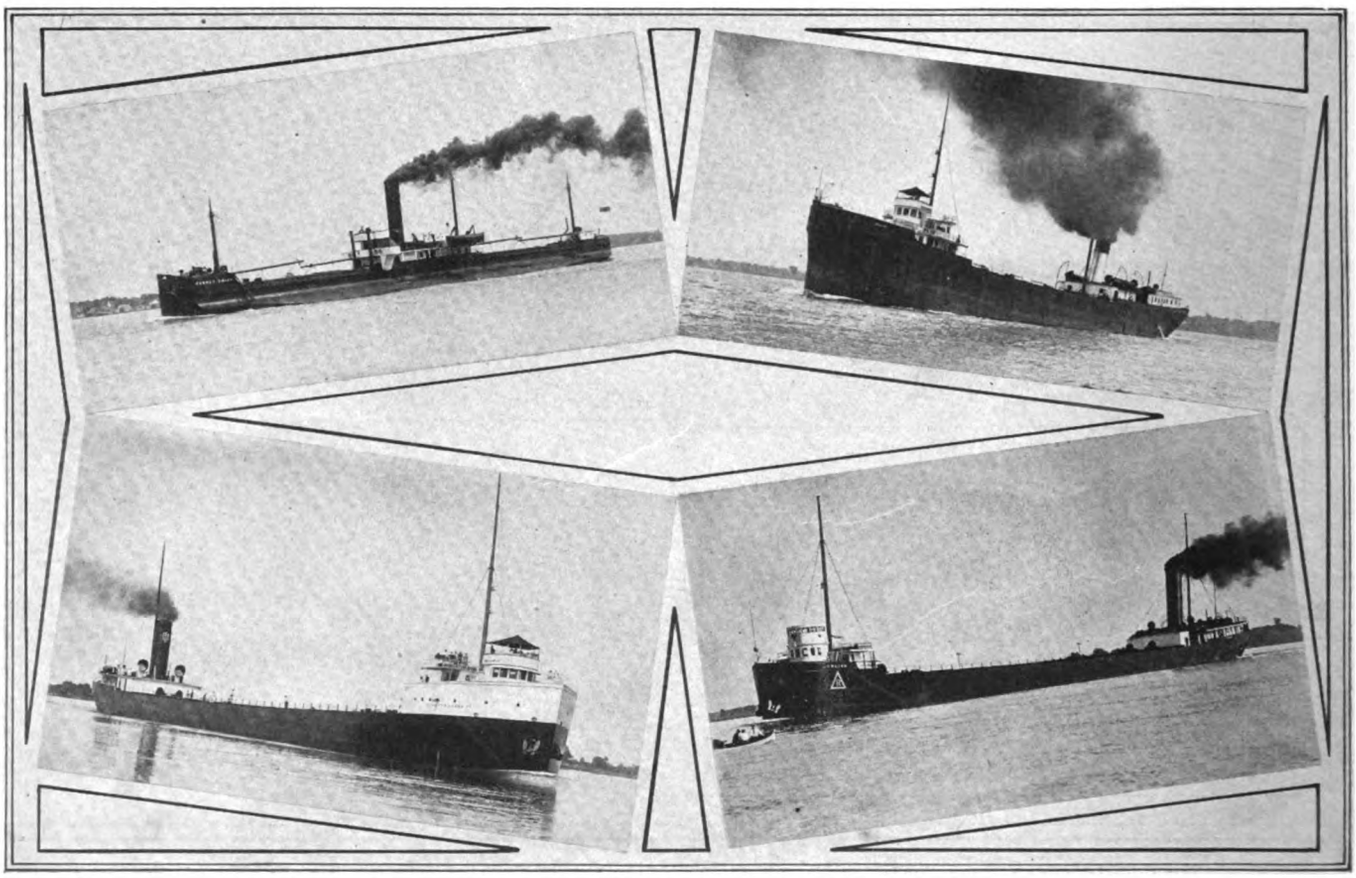
The steamer Victory, of the Interlake Steamship Co.'s fleet, went aground at the entrance to the Livingstone channel, Detroit river, and had to lighter part of her cargo before she could be released.

The Centurion, of the Cleveland-Cliffs Iron Co.'s fleet, crossed Lake Huron during the gale. She was pretty thoroughly pounded and lost 40 of her hatch sections.

The Steamer Black, of the Pittsburgh Steamship Co.'s fleet, had a serious time of it at Gary. While moored at the dock, the wind tore out her deck winches and she pounded pretty badly against the concrete wall, receiving heavy damage.

The history of such a storm, of course, can only be related by a recital of individual experiences. Probably no one who was out in it on Sunday, Nov. 9, will ever forget it. The wind blew at Cleveland for one minute on Sunday (at 4:40 p. m.) at the rate of 79 miles per hour and was followed by a wind for nine hours thereafter varying from 60 to 62 miles an hour. Its force may be well imagined when it snapped 2-inch steel mooring lines. The Pittsburgh Steamship Co. had a number of barges moored in the east basin within the breakwater at Cleveland. The barges were anchored bow and stern alternately in broadside fashion with cables running diagonally from barge to barge. The wind was so wild, however, that cables that would be secure under all ordinary conditions were loosened up with the result that the barges came together broadside. In some cases the bitts were actually pulled out of the barges by the wind, and three of them, the Thomas, Holly and Jenney, were blown upon the beach. The barges that were moored in the east breakwater were the Smeaton, Fritz, Roebling, Manila, Maida, Jenney, Thomas,

Vessels That Are Total Constructive Losses



TURRET CHIEF
H. M. HANNA JR.

MATOA
L. C. WALDO

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Corliss, Martha and Marcia. The damage to the barges will probably amount to $100,000.

The steamer Richard Trimble, of the Pittsburgh Steamship Co.'s fleet, was in the east breakwater at the time. She had both anchors out, well bridled with 45 fathoms of chain to each anchor or 16 tons of tackle altogether in good holding ground and yet she kept drifting. She had to keep her engines constantly working ahead to ease the strain on the chains, notwithstanding the fact that she had 8,000 tons of water in her.

The passenger steamer State of Ohio, which was moored in the west slip of the East Ninth street pier at Cleveland, parted her lines and rode diagonally across the slip, carrying a fleet of anchored motor boats with her and smashing them to pieces on the opposite side of the pier.

The storm came up with such sudden fury that several steamers lost their anchors before they had time to hoist them. The steamer Farrell, of the Pittsburgh Steamship Co.'s fleet, had to return to the Sault for this reason, having lost both anchors.

The steamer Northern Queen went ashore in a blinding snow storm at Kettle Point, one of the most dangerous places on Lake Huron, and was badly pounded. The members of her crew, at first reported drowned, were all saved.

It will be noted that no use appears to have been made of the life boats on the various vessels that foundered in Lake Huron, and the probability is that they could not be launched. It has been suggested that the chances of escape by means of life boat would be increased if the crew merely took their stations in the boats prior to the moment of foundering and allowed the life boat to float off as the vessel sank.

The wooden steamer Major, owned by Capt. John Mitchell, of Cleveland, was abandoned by her crew about 19 miles west of Whitefish Point, Lake Superior, on Thursday, Nov. 13. She was so thoroughly shaken up by the heavy seas running that it seemed impossible to keep her afloat and she was abandoned by the crew. The Major was picked up by the steamer Barnum, of the Tomlinson fleet, and towed to the Sault, where an examination was made of her, as a result of which the owners abandoned her to the underwriters as a total constructive loss.

That the gale was unmistakably a northeast gale on Lake Huron for a considerable period of time is proved by four photographs published herewith showing the havoc done along the shore at Port Huron. The canal at Port Huron is normally 30 ft. wide and has about 8 ft. of water in it. The great wind filled it with sand for a width of 80 ft., a depth of 8 ft., and for a distance of 1,000 ft. back from the shore line. In order to do this the sand had to be carried over a breakwall.

It will be noted from the pictures that the abutments of the bridge over the canal ware totally swept and the embankment itself eaten out. All along the shore at Kewahdin Beach trees were uprooted, concrete walks swept away, and the general shore line carried back to the very foundations of the houses.

The work of recovering the bodies of the drowned members of the crews of the various vessels was under the general supervision of the Welfare Plan Committee and the records kept

TOTAL LOSSES IN THE GREAT NOVEMBER STORM

Name of vessel.	Carrying capacity gross tons.	Value of vessel.	Insured for.	Cargo.	Insured for	Location of accident.
Str. Chas. S. Price.....	9,000	$340,000	$322,400	Coal	$21,700	Lake Huron.
Str. Isaac M. Scott.....	9,000	340,000	325,000	Coal	20,000	Lake Huron.
Str. H. B. Smith.....	10,000	350,000	338,200	Ore	38,000	Lake Superior.
Str. James Carruthers...	9,500	410,000	400,900	Grain	350,000	Lake Huron.
Str. Wexford	2,800	125,000	107,300	Steel rails	.....	Ft. of Lake Huron
Str. Regina	3,000	125,000	99 800	.....	.....	Lake Huron.
Str. Leafield	3,500	100,000	74,100	Steel rails	70,000	Angus Island, Lake Superior.
Str. John A. McGean...	7,500	240,000	.....	Coal	17,900	Lake Huron.
Str. Argus	7,000	136,000	.....	Coal	15,000	Lake Huron.
Str. Hydrus	7,000	136,000	.....	Ore	28,000	Lake Huron.
Bge. Plymouth	600	5,000	.....	.....	.....	Gull Island, Lake Michigan.
Lightship No. 82.....	180	25,000	.....	.....	.....	Point Abino, Lake Erie.
Bge. Halsted	800	5,000	.....	.....	.....	Green Bay, Lake Michigan.

CONSTRUCTIVE TOTAL LOSSES.

Name of vessel.	Carrying capacity gross tons.	Value of vessel.	Insured for.	Cargo.	Insured for	Location of accident.
Str. L. C. Waldo	7,000	$250,000	$227,700	Ore	$23,000	Manitou Island, Lake Superior.
Str. H. M. Hanna Jr....	8 500	315,000	301,200	Coal	20,000	Pt. Aux Barques, Lake Huron.
Str. Major	3,000	28,000	25,000	.....	.....	Nr. Whitefish Pt., Lake Superior.
Str. Matoa	3,104	117,900	.....	Coal	12,000	Pt. Aux Barques, Lake Huron.
Str. Louisiana	2,800	20,000	15,000	Light	.....	Washington Island, Lake Michigan.
Str. Turret Chief	3,100	100,000	.....	.....	.....	Copper Harbor , Lake Superior.

THE DEATH TOLL.

Vessel.	Lives lost.
Str. Wexford	18
Str. Leafield	18
Str. Argus	24
Str. Hydrus	24
Str. Charles S. Price.....	28
Str. Isaac M. Scott	28
Str. James Carruthers	22
Str. John A. McGean	23
Str. Henry B. Smith	23
Str. Regina	20
Str. Nottingham	3
Lightship No. 82.....	6
Bge. Plymouth	7
Total	244

DAMAGE TO STRANDED VESSELS

Vessel.	Location.	Estimated damage.
Str. Northern Queen.....	Kettle Point, Lake Huron.....	$25,000
Str. J. M. Jenks.....	Midland harbor, Georgian bay	25,000
Str. H. B. Hawgood.....	Weis Beach Lake Huron.....	7,000
Str. W. G. Pollock	Lake St. Clair ship canal.....	5,000
Str. G. J. Grammer	Lorain, Lake Erie	1 500
Str. A. E. Stewart.....	Whitefish bay	2,000
Str. Acadian	Thunder bay, Lake Huron	30,000
Str. Meaford	St. Mary's river	500
Str. Scottish Hero	Lake Superior	500
Str. Huronic	Whitefish Point	30,000
Str. Pontiac	Simmon's Reef, Straits of Mackinac	7,500
Str. Nottingham	Near Parisian Island, Lake Superior	75,000
Str. J. T. Hutchinson	Point Iroquois, Lake Superior	40,000
Str. F. G. Hartwell.....	Near Iroquois Light, Lake Superior	30,000
Str. Matthew Andrews.....	Corsica Shoal, Lake Huron	2 500
Str. Victory	Livingstone Channel, Detroit river	12,000
Str. D. O. Mills.....	Harbor Beach, Lake Huron.....	45,000
Str. Saxone	Lake St. Clair	1,500
Str. Fulton	Bar Point, Lake Erie	2,500
Pittsb'gh Steam. Co.'s barges.	Collided in breakwater, Cleveland	100,000

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PARTICULARS OF THE FLEET TOTALLY DESTROYED IN THE GREAT NOVEMBER STORM

Name of vessel.	Over all, ft. in.	Keel, ft. in.	Beam, ft. in.	Depth, ft. in.	Gross tonnage.	Net tonnage.	When built.	Owner.
*Str. L. C. Waldo	472	452	48 2	28	4,466	3,519	1896	Roby Transp. Co., L. C. Waldo, mgr., Detroit, Mich.
Str. Chas. S. Price	524	504	54	30	6 322	4,901	1910	Mahoning Steamship Co., M. A. Hanna & Co., mgrs., Cleveland, O.
Str. Isaac M. Scott	524	504	54	30	6,372	4,840	1909	Virginia Steamship Co., M. A. Hanna & Co., mgrs., Cleveland, O.
*Str. H. M. Hanna Jr.	500	480	54	30	5,905	4,413	1908	The Hanna Transit Co., W. C. Richardson & Co., mgrs., Cleveland, O.
Str. H. B. Smith	545	525	55	31	6,631	5,229	1906	Acme Transit Co., Hawgood & Co., mgrs., Cleveland, O.
Str. James Carruthers	550	529	58	31	7,862	5,606	1913	St. Lawrence & Chicago Steam Nav. Co., Ltd., Toronto, Ont.
Str. Wexford	270	250	40 1	16 7	2,104	1,340	1883	Western Steamship Co., Ltd., 72 Bay St., Toronto, Ont.
Str. Regina	269	249 3	42½	23	1,956	1,280	1907	Merchants Mutual Line, Toronto, Ont.
Str. Leafield	269	249	35 3	16 6	1,453	1,176	1892	Algoma Central Steamship Line, Sault Ste. Marie, Ont.
*Str. Major	303	283	41	22	1,864	1 491	1889	John Mitchell, mgr., Cleveland Steamship Co., Cleveland, O.
Str. John A. McGean	452	432	52	28	5,100	3,777	1908	Pioneer Steamship Co., Hutchinson & Co., mgrs., Cleveland, O.
*Str. Matoa	310	290	40	25	2,311	1,836	1890	Pittsburgh Steamship Co., Cleveland, O.
Str. Argus	436	416	50	28	4,707	3,380	1903	Interlake Steamship Co., Cleveland, O.
Str. Hydrus	436	416	50	28	4,713	3,384	1903	Interlake Steamship Co., Cleveland, O.
*Str. Louisiana	287	267	39	21	1,929	1,383	1887	Thompson Steamship Co., J. R. Davock, mgr., Cleveland, O.
*Str. Turret Chief	273	253	44	19 7	1,881	1,197	1896	Canadian Lake & Ocean Navigation Co., Toronto, Ont.
Bge. Plymouth	225	213	35	13	776	739	1854	McKinnon & Scott, Menominee, Mich.
Lightship No. 82	105	89	21	14	180	...	1912	Light-House Bureau.

*Constructive total loss.

by the committee were of inestimable value in serving to identify the dead. In fact, this particular feature was of such outstanding importance that it is understood that Canadian owners will organize welfare work of a similar character in the near future. Captain E. O. Whitney, of Ashtabula, was appointed chairman of a committee, consisting of R. A. Harrison, traveling commissioner of the Lake Carriers' Association; Captain Fred Weiner, of Pickands, Mather & Co.'s fleet; Captain George H. Bowen and Capt. J. A. Ferguson, of the Pittsburgh Steamship Co.'s fleet, to assume active charge of the work of recovery. This committee established headquarters at the Hotel Bedford, Goderich, Ont., and divided the lake shore into districts, each captain taking charge of one district. Each district was then subdivided into five-mile stretches and a patrol organized. The first thing done was to make a thorough search of the wreckage, which was piled up 5 or 6 ft. deep and carried back from 1,000 to 1,500 ft. beyond the normal shore line. Every inch of the ground from Kettle Point to Kincardine was

PARTICULARS OF THE FLEET THAT STRANDED IN THE GREAT STORM

Name of vessel.	Ov. all, ft. in.	Keel, ft. in.	Beam, ft. in.	Depth, ft. in.	Gross tonnage.	Net tonnage.	When built.	Owner.
Str. Northern Queen	319	299	40 6	24 6	2,476	1,885	1888	Mutual Transit Co., Buffalo, N. Y.
Str. J. M. Jenks	434	414	50	28	4,644	3,381	1902	Acme Transit Co., Hawgood & Co., mgrs., Cleveland, O.
Str. H. B. Hawgood	434	414	50	28	4,655	3,386	1903	Acme Transit Co., Hawgood & Co., mgrs., Cleveland, O.
Str. W. G. Pollock	440	420	52	28	4,872	3,585	1906	Valley Steamship Co., W. H. Becker, mgr., Cleveland, O.
Str. G. J. Grammer	454	434	48	28	4,471	3 703	1902	Seither Transit Co., W. H. Becker, mgr., Cleveland, O.
Str. A. E. Stewart	376	356	50	28	3,943	3,049	1902	Stewart Trans. Co., John J. Barlum, mgr., Detroit, Mich.
Str. Acadian	266 6	246 6	43	26 6	2,305	1,457	1908	Merchants Mutual Line, Ltd., Toronto, Ont.
Str. Meaford	268 5	248 5	42	20 6	1,889	1,201	1903	Farrar Transportation Co., Ltd., Collingwood, Ont.
Str. Scottish Hero	317	297	40	24 1	2,201	1,386	1895	Merchants Mutual Line, Ltd., Toronto, Ont.
Str. Pontiac	320	300	40	24	2,298	1,788	1889	Cleveland-Cliffs Iron Co., Cleveland, O.
Str. Huronic	328	308	43	27	3,329	2,211	1902	Northern Navigation Co., Sarnia, Ont.
Str. Wm. Nottingham	400	380	50	28	4,234	3 070	1902	Great Lakes Steamship Co., Cleveland, O.
Str. J. T. Hutchinson	366	346	48	28	3,734	2,870	1901	Pioneer Steamship Co., Hutchinson & Co., mgrs., Cleveland.
Str. F. G. Hartwell	524	504	58	30	6,223	4,865	1908	Mutual Steamship Co., G. A. Tomlinson, mgr., Duluth, Minn.
Str. Matthew Andrews	552	532	56	31	7,014	5,497	1907	Kinsman Transit Co., Henry Steinbrenner, mgr., Cleveland.
Str. Victory	472	452	48	27	4,527	3,704	1895	Interlake Steamship Co., Cleveland, O.
Str. D. O. Mills	552	532	58	31	6,598	4,850	1907	Interlake Steamship Co., Cleveland, O.
Str. Saxona	436	416	50	28	4,716	3,441	1903	Zenith Steamship Co., G. A. Tomlinson, mgr., Duluth, Minn.
Str. Fulton	444	424	46	28	4,219	3,181	1896	Pittsburgh Steamship Co., Cleveland, O.
Bge. Halsted	191	171	32	12 6	496	472	1873	Soper Lumber Co., W. E. Holmes & Co., mgrs., Chicago, Ill.

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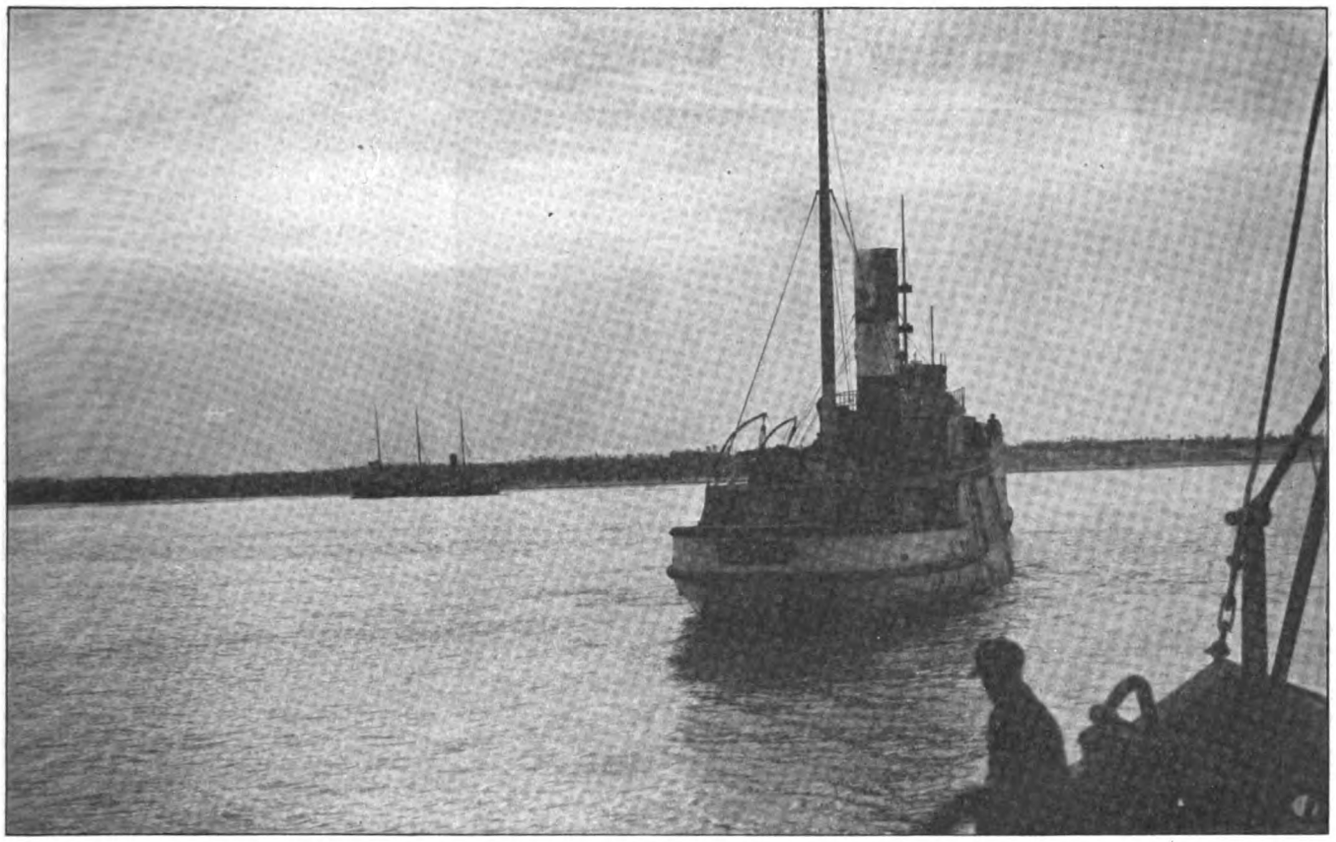
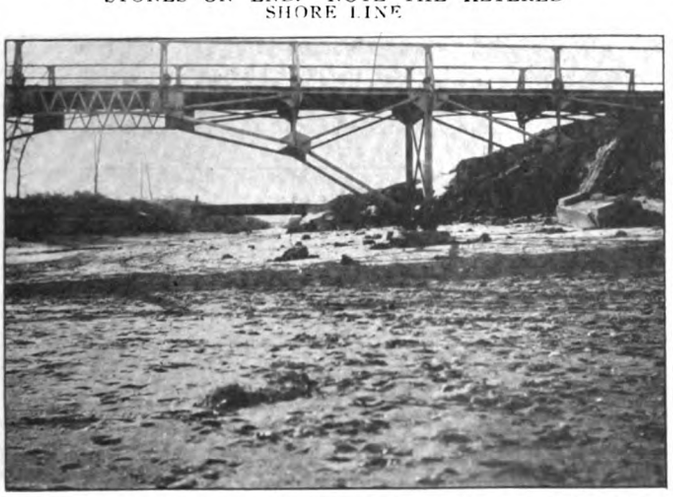


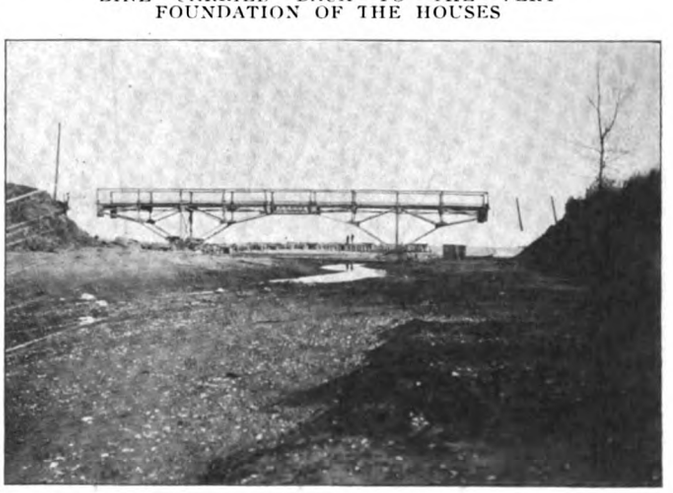
THE STEAMER NORTHERN QUEEN CAN BE SEEN IN THE BACKGROUND ON THE ROCKS OFF KETTLE POINT

THE GREAT STORM RIPPED UP THE CONCRETE WALK ON KEWAHDIN BEACH. THE FORCE OF THE WIND STANDING SOME OF THE CONCRETE FLAGSTONES ON END. NOTE THE ALTERED SHORE LINE

TREES WERE GENERALLY UPROOTED ALONG KEWAHDIN BEACH ABOVE PORT HURON AND THE EMBANKMENT WASHED AWAY AND THE SHORE LINE CARRIED BACK TO THE VERY FOUNDATION OF THE HOUSES



THIS PHOTOGRAPH LOOKING FROM THE LAKE SHOWS THE CANAL AT PORT HURON FILLED WITH SAND. THE SAND WAS CARRIED INTO THE CANAL OVER A BREAKWATER, GIVING SOME IDEA OF WIND VELOCITY



THE CANAL AT PORT HURON LOOKING TOWARDS THE LAKE. THIS CANAL, FORMERLY 30 FT. WIDE AND 8 FT. DEEP, IS NOW 80 FT. WIDE AND 8 FT. DEEP, BUT FILLED WITH SAND INSTEAD OF WATER FOR 1,000 FT. BACK FROM SHORE LINE

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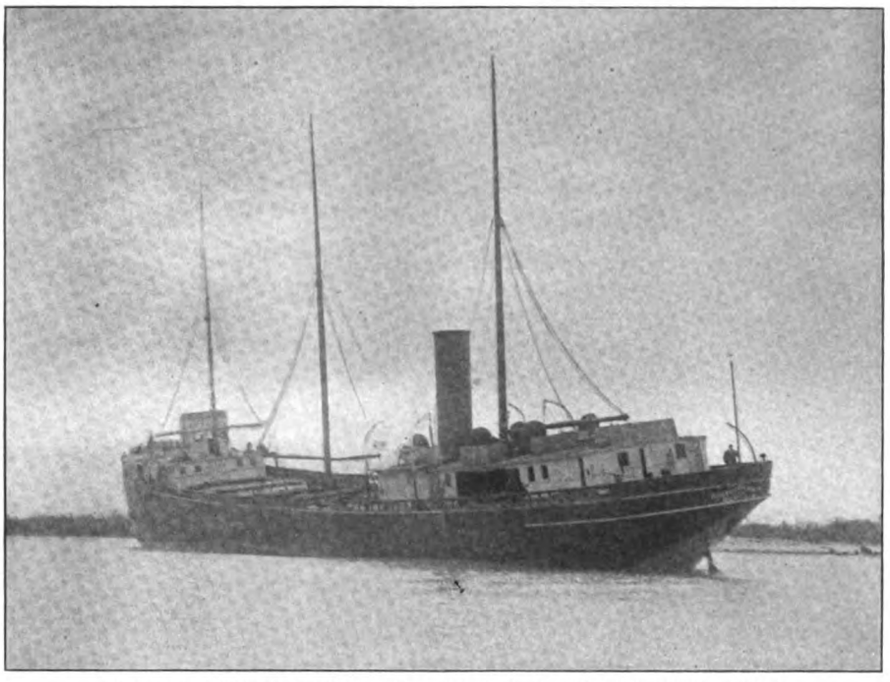


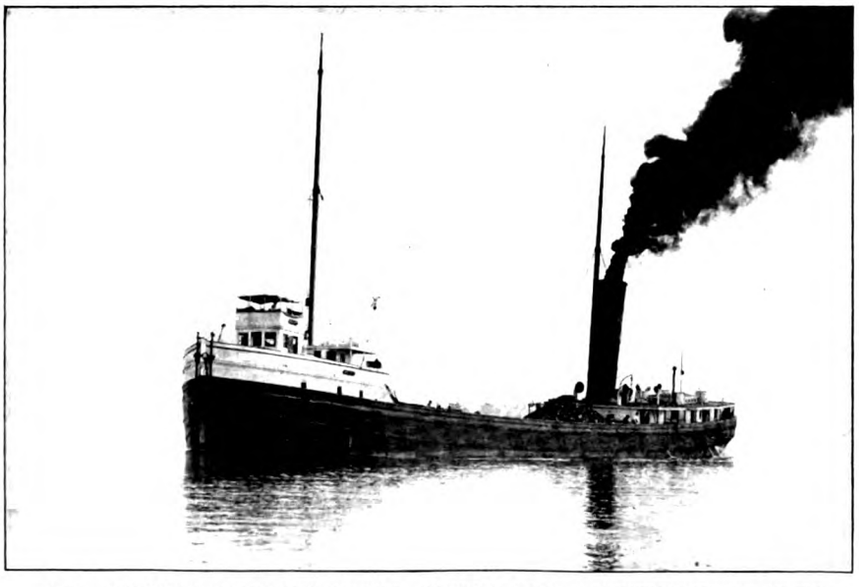
THE NORTHERN QUEEN ON THE ROCKS OFF KETTLE POINT

thoroughly examined. The tug Horton patrolled the water along the shore, using row and motor boats to make a more intimate search of the numerous inlets. The tug went northward as far as Cape Hurd and with the help of the natives, who were very earnest in assisting in the search, all the bays and islands were thoroughly explored. Meanwhile the Canadian revenue cutter Lampton cruised in the open lake, covering an area of 25 miles from shore. The Lake Carriers' Association issued a standing order of $25 reward for every body recovered. While this work was going on, the Lake Carriers' Association, through the Welfare records, obtained from relatives detailed descriptions of the members of the various crews and these, as they were received, were telegraphed to the headquarters of the searching party, where a systematic record was kept of them.

As the bodies were recovered they were taken to Southampton, Goderich, Kincardine or Sarnia, whichever might be nearest. Comparisons were then made with the descriptions filed with the committee and as soon as the body was identified, the Lake Carriers' Association communicated with relatives as to the disposition of the remains, meanwhile embalming and preparing the body for burial.

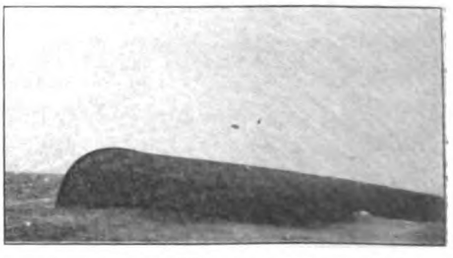
THE MYSTERY SHIP CHARLES S. PRICE

THE STEAMER H. B. HAWGOOD ON THE BEACH NEAR POINT EDWARD



THE WOODEN STEAMER MAJOR, WHICH WAS ABANDONED IN LAKE SUPERIOR BY HER CREW, A TOTAL CONSTRUCTIVE LOSS

Of the 32 bodies recovered from Lake Carriers' vessels, 28 have been identified. Of the 26 recovered from Canadian vessels, 13 have been identified. Of the identified bodies, in only one instance was the Lake Carriers' Association unable to turn the remains



ANOTHER VIEW OF THE PRICE

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over to the family and that was the case of a young man whose home was in Norway and who had no relatives in this country. Of the four unidentified bodies recovered from Lake Carriers' vessels, one is not definitely known as coming from a Lake Carriers' vessel. The body came ashore with a group of bodies from the steamer John A. McGean, but it had on a different life preserver; in fact, different from any life preserver carried on any Lake Carriers' vessel. Of the unidentified bodies, two are from the Argus and one from the Price. They have all been photographed and complete descriptions taken of them. The unidentified body supposed to be from the McGean and four from the steamer Carruthers have been buried at Goderich. Three bodies from the Argus, including the young man from Norway, have been buried at Kincardine. It was at first planned to assemble the bodies in one burial plot, but so much interest was aroused over the tragedy in the various towns that it was determined later to bury them locally.

Practically 95 per cent of the sailors employed on the vessels of the Lake Carriers' Association are registered and were it not for the records maintained by the Welfare Committee, it would have been impossible to carry on this work of identification with such fidelity and accuracy.

The Welfare Committee has already paid death benefits upon all bodies recovered and identified and all other death benefits will be paid as soon as it is stablished that the member of

Chief Engineer Mayberry's Statement

I am chief engineer of the steamer Howard M. Hanna Jr. We left Lorain on Saturday, Nov. 8, 1913, at 10 o'clock in the morning with a full cargo of coal, about 9,100 tons, bound for Fort William, Ont. We passed Port Huron Sunday morning, shortly after 5 o'clock. I went on duty Sunday morning about 6 o'clock. With me in the engine room were the second assistant engineer, John Cunningham, and Joe Dewey, oiler. We have three firemen on the boat and one was on watch. When we passed Port Huron the weather was good and it was also fair and clear when we passed Harbor Beach, at about 11:30, but at that time the wind was blowing quite hard; the direction then being about northwest. After passing Harbor Beach the wind shifted some and became about north. Before half past one or two o'clock the weather was hazy, but there had been no snow, but about that time, about half past two, it began to snow. The wind continued about north, sometimes being a little to northeast and other times to northwest. The boat made small headway, although the engines were all right and we had a sufficient supply of coal. About two o'clock I went down in the engine room. I was running the siphon and pumps to keep the water out. I put up canvases over the dynamo so as to keep them running. Everything went well until about 6:30. Then the oiler's door was smashed in on the starboard side, and the two engine room doors went in and the windows. At that time the water was rushing in the engine room awfully. About 7:30 the chief engineer's room's windows and doors went in and then it seemed one after the other went in just as they came. Then the cook's room and dining room went. The woodwork was carried away, part coming into the engine room and part went overboard. The water kept coming in until we went on the beach at ten o'clock. Lights didn't go out until we went on the beach. Engines didn't stop until we went on the beach. The smoke stack bent over before we struck and was carried away about the time we struck. Throughout the entire storm until we went aground the engines and all the machinery of the boat were working perfectly and we had all necessary fuel. When the ship fetched up about ten o'clock Sunday night she was about 600 to 1,000 ft. northeast of the Port Austin reef light and heading northwest by north. The port side of the vessel was on the reef and the starboard side evidently free because we were unable to get bottom by sounding. The waves continued to dash over the vessel. All hatches were carried away and it was impossible to go from one end of the ship to the other until about two o'clock Monday afternoon, when the second assistant engineer went forward and narrowly escaped drowning in doing so. Shortly afterwards some of the forward crew came aft; the engine room crew stayed in the kitchen and mess room. Tuesday morning, about nine o'clock, nine of the crew went ashore in the only boat of the ship that had not been carried away. Tuesday forenoon, about ten o'clock, the Port Austin life saving crew came out to the Hanna; the life saving crew first took six of the Hanna's crew ashore and then came back and took the rest. This accounts for the 25 men of the Hanna's crew. Monday afternoon when the second assistant went forward and when the forward crew came aft it was noticed for the first time that the ship had broken in two at about No. 7 hatch; at first the break seemed to be 3 in., but when we left the vessel on Tuesday, it seemed to have increased to about 7 or 8 in. And when we left the steamer she was full of water and all the upper works carried away.

Throughout the storm I was in communication with the forward end of the boat and with the captain by telephone which worked perfectly until after we went aground. I am sure that the steering gear of the vessel worked all right because the chains pass through the engine room and I could see and hear them working all right. Several times and at different times throughout the storm the captain telephoned me asking me if the engine was working all right and I informed him that it was and he told me they were trying to hold the vessel into the sea but were unable to do so. I do not know of anything going wrong with the steering gear at all until after the vessel fetched up. All there was to it is that the vessel got into the trough of the sea and could not be worked out and the heavy wind and sea carried her until she went aground.

All the men on the engine room crew worked the best I have ever seen men work anywhere and every man did his full part even when the water was coming into the engine room in torrents. Personally I do not know of anything that could have been done that was not done and I lay the disaster altogether to the terrific storm that we encountered which was the worst I have ever known in all my years of sailing.

About eight o'clock Sunday night the heavy sea coming over the after end of the boat washed away part of the wood work and carried part of the wood work and the steward's wife down the engine room stairs, the steward's wife landing at the foot right beside me, but so far as I am now advised she was uninjured.

We had plenty of steam until the vessel went aground. The fire room crew had been increased as the storm increased, so we had no trouble on that account, but immediately when the vessel went aground water came into the boiler room and the fires were put out. When we left Lorain we had in the coal bunkers probably 300 tons, so that when the vessel went aground we had probably 250 tons of fuel coal.

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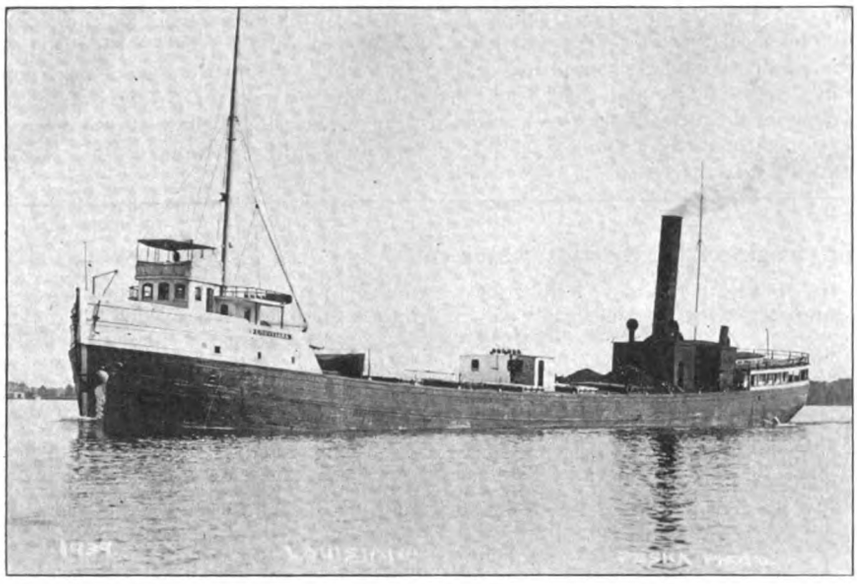

THE WOODEN STEAMER LOUISIANA WHICH STRANDED ON WASHINGTON ISLAND, LAKE MICHIGAN, AND CAUGHT FIRE, BECOMING A TOTAL CONSTRUCTIVE LOSS

the crew was actually on the boat, whether the body is recovered or not. This will involve the disbursement of about $20,000.

The Welfare Committee was greatly assisted in the work of identification by the Western Union and Postal Telegraph companies, which carried all such messages free.

The hull value of the vessels totally lost amount to $2,332,000; the constructive total losses, $830,900, making the total value of hulls destroyed $3,162,900. The damage to stranded vessels, as calculated by the underwriters, amounts to $620,000, while the losses on cargoes will not be far from $1,000,000, making the aggregate loss to vessels and cargoes $4,782,900.

Capt. Richardson Orders Steamer

Capt. W. C. Richardson, of Cleveland, has given contract to the American Ship Building Co. for a bulk freighter to replace the H. M. Hanna Jr., which stranded on Port Austin reef, Lake Huron, in the storm of Nov. 9th, becoming a total constructive loss. The new steamer will be somewhat larger than the wrecked vessel, being 524 ft. over all, 504 ft. keel, 54 ft. beam and 30 ft. deep. Her engines will be triple-expansion with cylinders 23, 38 and 63 in. diameters by 42-in. stroke, supplied with steam from two Scotch boilers, 15 ft. 4½ in. diameter and 11½ ft. long, fitted with Ellis & Eaves draft, and allowed 170 lbs. working pressure. The new steamer will be built at Cleveland and is promised for delivery next May. Other owners that lost vessels are now figuring with the ship building companies for new tonnage.

The Brude Life Boat

Konrad Furubotn, 8 Bridge street, New York, has sent to the International Conference on Safety of Life at Sea a powerful argument in favor of the adoption of the Brude life boat by steamship lines, to which further attention will be given by THE MARINE REVIEW in a later issue. The Brude life boat sailed across the Atlantic from Norway to Boston in mid-winter a year ago, proving its seaworthiness and efficiency. Certainly no open boat of similar dimensions could have done the same thing. The Brude life boat is shaped like an egg and is entirely covered over. It has seating accommodation inside for 44 persons and outside for 30 persons, if need be. It is really a combination of life boat and life raft and is propelled by sail and also by oars. One of the Brude life boats is installed on the car ferry Ashtabula, of the Pennsylvania-Ontario Transportation Co.'s fleet operating out of Ashtabula, Lake Erie.

H. W. Johns-Manville Co.

The Cleveland branch of the H. W. Johns-Manville Co. has recently been obliged to provide larger quarters for several of its subsidiary offices. The Columbus office and contract department are now located on the ground floor of the new seven-story fireproof Peters Power building, 45 West Long street, with large warehouse facilities half a block distant. The Toledo office and warehouse have been moved to 213 Water street. This office has just completed a pipe covering, stack lining and cork tiling job in the Second National bank building, Toledo, which possesses many unique features. Other Cleveland branch sub-offices are located in Akron (717 Second National bank building); Dayton (259 Fourth street arcade), and Youngstown (502 Stambaugh building). Resident representatives are stationed at Lima, Massillon, Greenville and other points in Ohio, also at Huntington and Parkersburg, W. Va. Their work is supplemented by a large corps of traveling men. Last, but not least, the Cleveland branch has just closed a long-term lease for another larger warehouse on Front street, which, when remodeled, will give the branch larger and better storage and shipping facilities than ever.

Commerce of Lake Superior

The commerce of Lake Superior as measured by the canals at Sault Ste. Marie totaled 10,919,274 tons during October as against 10,910,365 tons during September and 11,489,444 tons during August. The total movement to Nov. 1 was 51,732,783 tons as against 49,703,464 tons for the corresponding period last year, an increase of 2,029,319 tons. Following is the summary:

EAST BOUND.

	To Nov. 1, 1912.	To Nov. 1, 1913.
Copper, net tons	89,988	77,492
Grain, other than wheat, bushels	38,256,754	78,236 823
Building stone, net tons	2,282	6,181
Flour, barrels	6,782,396	8.255,362
Iron ore, net tons	42,171,157	44,678,144
Pig iron, net tons	19,087	20,399
Lumber, M. ft. B. M.	577,794	524,030
Wheat, bushels	111,636,750	137,530,449
Unclassified freight, net tons	203,624	361,722
Passengers, number	31,341	37,047

WEST BOUND.

Coal, anthracite, net tons	1,682,355	2,403,624
Coal, bituminous, net tons	10,937,040	14.308,378
Flour, barrels		2,303
Grain, bushels	100	400
Mfctd. iron, net tons	523,373	320,571
Iron ore, net tons	6,660	32,376
Salt, barrels	566,487	603,685
Unclassified freight, net tons	1,181,047	1,055,879
Passengers, number	33,794	39,302

SUMMARY OF TOTAL MOVEMENT.

East bound, net tons	48,254,518	52,681,355
West bound, net tons	14,414,981	18,311 213
Total	62,669,499	70,992,568
Vessel passages	19,898	20,864
Net registered tonnage	49,703,464	51,732,783

The Empire Engineering Co., Buffalo, has been awarded contract for enlarging the small dry dock at the plant of the Buffalo Dry Dock Co. The new dock will be 402 ft. long, 96 ft. wide at the top and 58 ft. wide at the bottom.

The Pittsburgh Steamship Co.'s nautical school opened on Dec. 1, under the direction of Capt. Sam Gould, at 301 Perry-Payne building, Cleveland, O.

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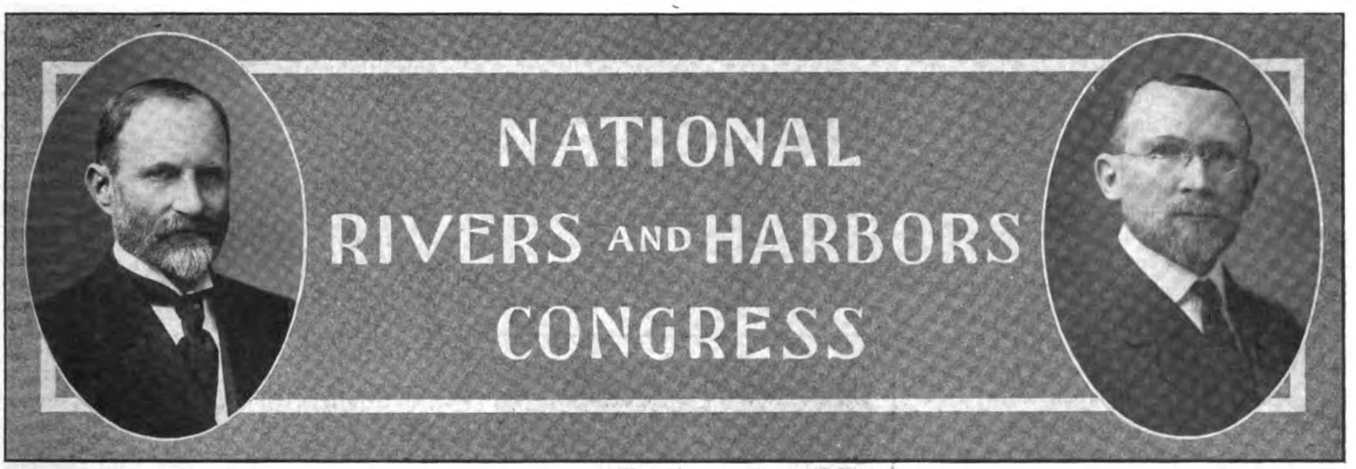

PRESIDENT JOSEPH T. RAMSDELL

SECRETARY R. A. THOMPSON

By Thomas Wilkinson

WHILE making a trip of inspection down the Ohio river in 1903 with the committee on rivers and harbors of congress, Hon. Theo. E. Burton, then chairman of the committee, remarked upon the spirit of apathy which had grown up and was existing among the people in regard to our inland waterways, especially our rivers, until the river and harbor bills passed by congress had become a national by-word considered as a medium from which congressmen helped themselves to benefit their respective localities and to secure the good will and votes of their constituents.

Formation of National Body

The situation was so distasteful to Mr. Burton and his fellow members of the committee that he earnestly suggested the formation of a large national body, for the purpose of correcting and changing the existing sentiment, by calling attention to their commercial value and creating a live and active public interest in the development and improvement of our rivers, that they might be made a potential complementary system of transportation to carry its share of the rapidly increasing commerce of the country.

Shortly after this, a number of representative business men from various parts of the country each deeply impressed with the importance of the movement, met at Cincinnati for the purpose suggested by Mr. Burton. At this meeting the National Rivers and Harbors Congress was organized, and its first annual meeting was held at Washington in 1904, where its annual meetings have since been held each succeeding year.

It was organized with a fixed policy, to which it has strictly adhered. Its slogan has always been the development of water transportation and calling attention to the necessity for and urging upon the general government the adoption of a broad and comprehensive plan of improvement of all of our navigable waters, with sufficient annual appropriations to carry on the work to completion in a businesslike way quick as possible. It favors no particular project, treating all alike as included in its general policy.

Through its position of dignity as a national body its strength and influence has increased from year to year. It has been the means of raising to a position ranking with that of any appropriations bills passed by congress the river and harbor bills carrying increased appropriations, so that the improvement of our inland waterways is being rapidly carried on, and in a few years many of them will be completed.

The splendid work it is doing merits the heartiest co-operation and financial support of every citizen.

But this is not all. There are other things that are as fundamentally essential as the improvement of the channels that must go hand in hand with it for the development and growth of inland water-borne commerce.

The general government having expended vast amounts in good faith in the improvement of the waterways, in response to the public demand for their improvement, there is a moral obligation resting upon the people to make proper use of them.

Providing Facilities

That our rivers, when improved for permanent navigation, may be used as carriers of freight in a measure commensurate with their possibilities and cost of their improvement, it will be absolutely necessary for the people themselves to provide the facilities therefor, which means in short:

1.—Modern freight carrying vessels of different types, adapted to the carriage of all classes of bulky and package freight.

2.—Adequate port terminals, equipped with modern mechanical devices for quickly and economically loading, unloading and transferring freight of all kinds. These terminals to be constructed upon a uniform standard plan, designed by competent water terminal engineers.

3.—Physical connection and co-operation with the railroads for free and easy interchange and pro-rating of traffic, so that freight can be moved to and from the waterway to and from interior points upon the land.

The experience of other countries shows conclusively the wisdom of providing these transportation facilities, for thereby the commerce of their ports has been greatly increased and the general growth and prosperity of the communities largely augmented.

Out-of-Date Methods

The system in vogue of loading and unloading freight by manual labor on the old fashioned levees or landings, without any improvement since the first steamboats navigated our rivers, is altogether out of date. It is so expensive and inconvenient that the shipping public will not patronize the river to any extent, preferring the easier and more convenient facilities provided by the railroads, through which they have grown in popular favor until they have practically absorbed all inland transportation. It must give way to new methods developed along lines adapted to modern requirements in order to secure traffic on the rivers in proportion to their capacities.

It is equally essential that the port terminals and all of their functions be owned and operated by the municipalities free and open to all carriers alike, whether by water or by rail, so as to preserve the public

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character of the channels with all of their inherent advantages. This can best be carried out through a department of public docks, under charge of a dock board, in each town or city. Where state laws do not exist for the creation of this department they should be enacted early as possible. Such laws were enacted by the legislatures of Minnesota, Wisconsin, Illinois and Iowa at their last session.

Amortization of the cost of the terminal and the expense of operating it, when carefully managed, could easily be taken care of through moderate service charges, without being a public burden, and at the same time be a saving to both the carrier and the shipper.

Through the heart of the Mississippi valley, the most fertile and most productive valley on earth, flows the Mississippi river from nearly the Canadian boundary on the north to the Gulf of Mexico on the south, which, with its tributaries, aggregates nearly 16,000 miles of navigable waters, equal in length to nearly five transcontinental railroads, and of unlimited carrying capacity. On the opening of the Panama canal, every port on these rivers will be in direct water communication with all the ports of the world. These water routes, when properly utilized, will be able to supply such cheap transportation as will enable American industries to compete on even terms with those of other countries in all markets.

Let the people face the situation squarely, and avail themselves of the opportunity within their reach to increase their commerce and wealth, by doing what is so essential and important, in the way of providing adequate facilities for utilizing our great system of waterways to its full extent commensurate with its possibilities and the vast sum expended by the general government upon its improvement. Then the purpose for which the National Rivers and Harbors Congress was organized will have been accomplished.

Capt. Ulster Davis resigned his position as president and manager of the Albany Towing Co. on Sept. 1 and has started in business for himself in general transportation on the Hudson river and barge canal.

The Seattle Construction & Dry Dock Co. has been awarded the contract for three steel ocean-going tugs and nine steel barges for the department of supplies and accounts, Puget Sound navy yard.

The Nation's Waterways

By Henry W. Hill

The National Rivers and Harbors Congress, whose tenth annual convention will occur in Washington on Dec. 3, 4 and 5, 1913, will consist of delegates from all parts of the United States, assembled for the purpose of considering waterways development as a policy and not a project,

HENRY W. HILL.

Hon. Henry W. Hill, of Buffalo, N. Y., was a member of the New York constitutional convention of 1894, member of the New York assembly from 1896 to 1900 and of the New York state senate from 1901 to 1911. He is the author and advocate of various New York constitutional amendments and of a work on "Waterways and Canal Construction in New York State," and of several encyclopedic articles. He was the principal advocate of the barge canal referendum measure through the senate and before the electorate in the state of New York in 1903. He is the president of the New York state waterways association, a director of the National rivers and and harbors congress and one of the well known authorities on waterways matters in this country. His writings are quoted in Germany and in France and he has been honored by the president of France, who has recently made him a knight of the National Legion of Honor of France, in recognition of his public services and literary work as the author of the valuable historical reports of the Lake Champlain tercentenary commission. He is the president of the Buffalo Historical Society, a trustee of the University of Vermont, and a practicing lawyer of the city of Buffalo.

nation wide in scope and intensely interesting in the discussion of its important phases. The Great Lakes region ought to furnish a large number of delegates from the seven states bordering thereon, who are alive to the needs of national appropriations to develop and improve tributaries to the Great Lakes, the large harbors and also the channels connecting the same. They afford a large part of the commerce of the United States, measured in tonnage, aggregating from seventy-five to one hundred million tons annually, carried at a rate of three-tenths to three-fourths of a mill per ton mile, and outranking in importance the commerce of any other similar waterways in the world.

Duluth has a tonnage equaling that of London, and Buffalo a tonnage equaling that of Liverpool, and the other great ports have correspondingly large volumes of tonnage, handled by them respectively annually. This vast tonnage is floated over five of the largest fresh bodies of water in the world, along the northern frontier, contributed by the seven states bordering on the Great Lakes and other central and western states, contributing their mineral, agricultural and manufactured products in a volume so large that it outranks the tonnage produced by any other equal area in the world.

All the ports of the Great Lakes have received and ought to continue to receive liberal appropriations from the federal government for their improvement and development, in addition to what may be done by the municipalities and states affected. The state of Ohio has its great port of Cleveland, its great iron ore ports of Ashtabula and Conneaut, and, in addition, the port of Toledo, which has a considerable annual tonnage. This important matter may be lost sight of unless the representatives of these great ports impress upon conventions such as those held annually by the National Rivers and Harbors Congress, the necessities of these ports, which ought to be presented forcefully to the thousands of members there convened, and also to the members of the federal congress, many of whom attend and who are directly responsible to the people for liberal appropriations for waterway improvements.

Hitherto the attendance from the Great Lakes region, at the sessions of the National Rivers and Harbors Congress, has been smaller in proportion to the interests involved than the attendance from the Mississippi, Missouri and Ohio valleys and from the southern states. It is encouraging to note that THE MARINE REVIEW, of Cleveland has sounded a warning in this respect, and is doing much to awaken a greater interest in the National Rivers and Harbors Congress. There will be assembled delegates from all over the nation, ready and willing to listen to what may be said in relation to the demands of various localities; and it is the one great forum of the nation, outside of the congress of the United States, where ample opportunity is afforded by the officers of the national organization

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for the presentation of the needs for waterway improvement for all parts of the nation. It is one of the hopeful signs of the times that representatives of different parts of the United States are willing to assemble annually in such numbers, to discuss matters of such vital importance to their localities and to the nation at large.

We have heard during the last year something of the foresight and policy of foreign nations in their attitude toward river and harbor improvement, through the delegates that assembled in Philadelphia at the 12th convention of the Permanent International Association of Navigation Congresses. Many of the delegates of that great international organization sailed from Buffalo to Cleveland, to Chicago and to Duluth studying the conditions existing along the Great Lakes, over which a large part of the waterway commerce of the United States is economically transported. Through the papers and addresses and personal interviews of those distinguished representatives of foreign nations, we learned much of the practical phases of river, harbor and waterway improvement in general that engage the attention of such nations as Germany, France, Austria, Russia, Italy, Belgium, the Netherlands, Denmark, Norway and Sweden, and especially of Great Britain, whose merchant fleets sail every sea and reach practically every portion of the habitable globe. We have been able to learn from them how they overcame obstacles to navigation in their interior and coastwise waterways, and possibly we may get some inspiration from the success which has attended their intelligent efforts to improve commerce over their waterways which are far inferior in adaptability to the Great Lakes, to the requirements of a world-wide commerce.

Nine Conventions

The nine conventions of the Rivers and Harbors Congress have awakened in the people of this nation a greater appreciation of the economical advantages of transportation by water for large volumes of tonnage over those of transportation by rail, or in any other manner. In the next, which is the tenth annual convention of the congress, the demands that may properly be made upon the congress of the United States for liberal appropriations ought to be so forcefully presented that the national government may be impressed and liberal appropriations made to meet these demands. The ports of Cleveland, Buffalo, Detroit, Milwaukee, Chicago and Duluth and others ought to send large and enthusiastic delegations to the National Rivers and Harbors Congress, to awaken deeper internal and broader national conception and appreciation of the magnitude and importance of the Great Lakes as highways for a large portion of the commerce of the nation.

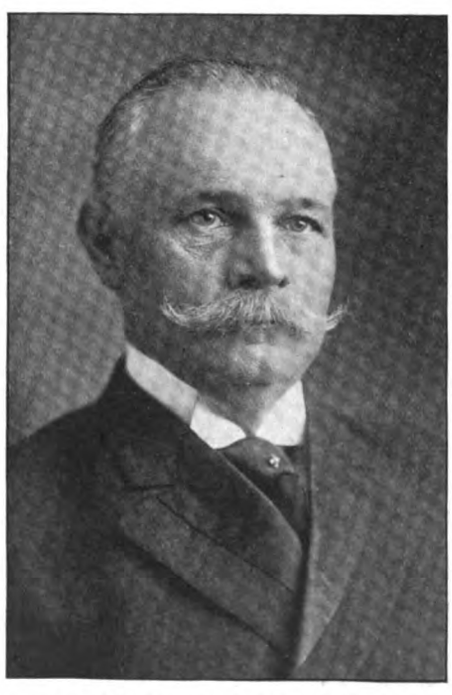
The declaration of principles embodied in the resolutions of the last National Rivers and Harbors Congress clearly shows that the organization is nation-wide in its scope, and is doing a great work in promoting more intimate commercial relations with all parts of the nation.

There is still much to be done before all of our waterways are brought into practical communication. I venture the prediction that the time will come when it will be possible for barges to pass from state to state, and through the large parts of such states as New York, which has authorized an expenditure of $127,800,000 for the improvement of its barge canal system, and it will then become a matter of national concern as to the regulation of such interstate commerce as already indicated in the amendments made to the interstate commerce law.

Atlantic Inland Waterways

Two Important Waterway Association Meetings Are Held in the South — Address of Senator Fletcher

THE Mississippi to Atlantic Inland Waterway Association of which Senator Duncan U. Fletcher is president, and Leland J. Henderson, of Pensacola, is secretary, held its sixth annual convention at Palatka, Fla., Nov. 17 and 18. After adjournment the members went to Jacksonville and attended the sessions of the Atlantic Deeper Waterway Association, of which J. Hampton Moore is president. This convention remained in session until Nov. 21. The Atlantic Deeper Waterway Association advocates an inland waterway along the Atlantic coast from Cape Cod to Key West. President Wilson telepraphed the association as follows: "May I not send my cordial greetings. The intercoastal waterway seems to be an enterprise of national importance. I tried as governor of New Jersey to show my sympathy with it and my desire to co-operate in its accomplishment. I wish this convention success both in counsel and in the realization of its hopes."



SENATOR DUNCAN U. FLETCHER

Senator Fletcher's address at the Palatka meeting was as follows:

Since our last meeting, considerable progress has been made in connection with the project advocated by this association. Work is being pushed rapidly on the canal connecting the Apalachicola river with St. Andrew's bay. The last river and harbor bill provided for a survey between Pensacola and Mobile bay, which will be favorably reported in time for the next bill. The improvement of the Ocklawaha river will be recommended by the engineers, and when that is completed, being on the route favored by the engineers across Florida, the waterway will be more than half across the state. It will be an easy matter to connect with the Withlacoochee river on the other, and thence proceed to the gulf. The survey and estimates were made for a canal connecting St. Andrew's bay

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with the Choctawhatchie bay, but the report was unfavorable, owing to lack of commerce in that vicinity. Eventually, it is expected this connection will be made. The country in that region is fast building up, and commerce growing. It will not be long before Pensacola will have access by water to the coal and iron fields of Alabama.

Barges on Black Warrior River

At present, barges, each having 1,000 tons capacity, self-propelled, are being operated from the Black Warrior region of Alabama, down the rivers to Mobile bay, thence along the Mississippi sound, Lake Borgne, Lake Borgne canal, and the Mississippi river to New Orleans. An immense saving of freight is assured on coal and iron handled by these barges. Here we have an illustration of what the improvement in inland waterways means. The heavy, bulky freight can be transported much more cheaply by water than by rail, and the railways have no grounds of complaint by reason of the competition, because in the first place they have all they can do to handle the quick-moving freight, which is at the same time most remunerative. The barges mentioned will make the trip from the mine region of northern Alabama to New Orleans in 72 hrs., and it is intended to build a fleet of fifteen barges for this service, expecting that coal will be moved into New Orleans at the rate of 50,000 tons a month. These barges are being built by the Alabama & New Orleans Transportation Co., which controls the Lake Borgne canal. The shipyard is located about 12 miles below New Orleans, when the canal empties into the Mississippi. They are propelled by twin screws, driven by twin engines, and have a speed of approximately 7 miles an hour, when fully loaded. They are of steel construction and similar to those used on the canals of Holland, being 240 ft. long, 32 ft. wide on deck, 28 ft. at the bottom. Waste coke from the ovens of the Birmingham district is the fuel used by which gas for the engines is furnished by 150 H. P. producer. Only three men for each barge are required to operate them. Similar barges could be used on the inland routes anywhere, and they can be moved in 30 in. of water, and 7 ft. gives ample depth for them fully loaded. These barges have moved outside from Mobile around into Santa Rosa sound, and to St. Andrew's, but in such cases they have to wait for good weather, as navigation in the open gulf is more or less uncertain and risky for them.

It is given as a fundamental physical fact that the amount of power required to move a ton on the railroad is fifteen times as great as the amount required to move the same weight on a boat. This fact alone would account for inherent cheapness of water transportation. It is the fact that development of commerce and industry will inevitably follow improvement of waterway, if it is given a fair chance. The illustration of the use of the waterways mentioned, in itself proves that waterways furnish the cheapest possible transportation, and this is the chief reason for their construction. If further illustration is needed to establish the advantages of waterway improvement, one only need look at the map and note that the greatest cities, the densest populations, the most prosperous industrial regions, are located on or near waterways. Railroad transportation alone, while of the greatest importance, will never cause to be built any city of the size and extent possible for it, if it had, in addition, transportation by water.

Factors in the Nation's Progress

There are three essential elements of growth. There are three moving causes for prosperity. First; production; second, distribution; third, regulation. We sometimes name the three great supports of our institutions,—the three pillars of a nation's strength, as agriculture, commerce and labor. It is somewhat a question of terminology as to the words to use to express the main idea. In connection with waterways we deal chiefly with distribution, which includes commerce. There are two means of distribution—(a) by land; (b) by water. We need them both. Neither is absolutely complete by itself. Neither supplies all the needs of the country. In the first place, we need competition between the two. Such competition as would be wholesome, regulative, and prevent monopoly. In the next place, certain articles of freight, such as do not have to reach markets in a hurry, such as bulky and less remunerative freights, should be more economically transported by water. The producers, the manufacturers, those engaged in industries and the consumers, are all entitled to have the cheapest possible transportation, because the expense of transportation adds no little to the cost of the articles consumed. The problem of economical distribution is not yet solved in this country. It is one of the problems that is in process of solution, and the sooner it is solved, the better. Take for instance, the value of farm products annually on the farms. Government reports show that last year these products were worth on the farms $9,500,000,000. It is fair to assume that one-third of them were consumed by the farmers. The value then on the farms of the products going to market, was, in round numbers, $6,000,000,000.

The Item of Distribution

It is estimated that the consumers paid for these products $13,000,000,000; in other words, the consumers paid $7,000,000,000 more than the producers got. Of course not all this, nor perhaps a majority part of this went for transportation. In addition to that item, there was waste all along the line, and there was the cost of distribution, profits of middlemen and the like. These various elements entering into the item of distribution from the farm to the breakfast table are items which need very careful looking after. Some of them can be reduced, some of them can be eliminated, all of them can be made more advantageous, to the end that the producer will get more for his product, and the consumer pay less. I submit that sound economies and real progress call loudly for reform in these directions.

It may be suggested that the canals and inland waterways may not be sufficiently useful, nor sufficiently justified by available and possible commerce, to cause us to enthuse greatly over their construction. My contention is that these inland waterways will not only afford a means of transportation for local traffic, but when connected up, they will provide for the long haul practically from the Mexican to the Canadian borders. We need them, first, for the local service; second, they will be used to move commodities to market which at present are required to wait for a long while before a ship's cargo is completed at some deep water port; third, the waterway would be useful in assembling cargoes at shipping points for large vessels. There should, of course, be a connecting system, if possible, so that a barge might start at the Rio Grande, proceed along the gulf and then up the Atlantic coast, either into the great lakes, or further north. The barges can be operated at very little cost, only small crews being required, and moving night and day they could deliver freight about as quickly as the railway trains. Even where the inland waterways are not connected into a complete system, the various lines are valuable as affording means of getting products to market, and of moving products to points

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of distribution by rail or by seagoing vessels. Another advantage of these waterways is that they are available to every shipper,—they are free highways of commerce. Anyone can use them under reasonable rules and regulations.

It is essential that suitable terminals shall be provided at shipping points, and these should be owned by municipalities and regarded as public utilities. The powers and authority of the Interstate Commerce Commission should be made, if they are not already sufficient, to include the regulation of rates on inland waterways involving interstate traffic, and requiring traffic arrangements between the waterways and rail lines. The commission should have power to fix the minimum as well as the maximum rates on the rivers and canals and the entire system.

Facilities for Trade

We need to provide every facility for carrying on trade, not only between different coasts of the United States and various regions along the same coast, but with foreign countries. The completion of the Panama canal foretells immense increase in our trade. Commercial transactions are experiencing a new stimulus. The commerce which will move along the Atlantic and Gulf coast and out through the south Atlantic ocean and Gulf of Mexico, is bound to increase in volume. Our deep water ports will be taxed to their utmost. The chief points of distribution will be crowded. The demand for facilities will be urgent and continuous. Our railway lines will experience no want of business no matter to what extent we improve our harbors and rivers and build canals connecting up a great, efficient, complete waterway system. The recent tariff act carries a provision which gives a 5 per cent differential in favor of imports carried in American bottoms. This legislation will unquestionably stimulate shipbuilding in this country, and greatly benefit our merchant marine. This is not new. About the first tariff act recorded on the statutes of the United States, prepared by James Madison, and approved by George Washington, and commended by Thomas Jefferson, was just such a provision in the earliest days of the republic. For some reason it was dropped, after some years. Now in this century we are impressed again with its wisdom and we realize the necessity for ships, and the building up of our maritime interests.

Cheap transportation furnished by the highly developed waterways is generally admitted to be a chief contributing cause of Germany's marvelous industrial and commercial growth. The railroads are government-owned and operated, and are not employed to destroy a supplementary method of transportation.

France has adopted a comprehensive scheme for improving her rivers and harbors and internal waterways, involving the expenditure of $212,000,000. The extension and improvement of canals will be included. Not over 60 miles of existing canals are not in use for transportation purposes. Canal navigation contributes immensely to supply facilities to many towns and cities. No country has the natural conditions which the United States possesses, by reason of which waterways can be more conveniently available so readily.

Great improvement has been made in the means of furnishing motive power. The gasoline engine for boats, the producer gas engine for barges, the refrigeration devices whereby fresh meats and fruits and vegetables can be preserved in transit for months are modern appliances which will increase the use of waterways and add to water-borne commerce.

In making navigable many rivers, that mysterious hydro-electric power can be developed and transmitted hundreds of miles to turn the wheels of industry. One cu. ft. of water falling 9 ft. every second makes one truck horsepower. Millions of horsepower can be developed in our rivers and streams and today as you travel across the country you observe a perfect forest of towers along which this power is being transmitted for lighting cities, operating car lines, running the machinery in factories and developing new enterprises and opening up new opportunities.

Florida is peculiarly blessed by rivers, harbors, lakes, bays, bayous and sounds which only need to be connected up by easy and inexpensive means.

The South Atlantic and Gulf states have been given by nature wonderful waters which can be readily joined so as to furnish thousands of miles for navigation by every kind of craft.

It is our duty to improve and utilize these facilities.

W. B. Close, senior member of the banking house of Close Bros. & Co., of London and Chicago, is authority for the statement that the White Pass & Yukon route will build two first-class ocean-going steamers to ply between Seattle and Alaskan ports. The new steamers will cost approximately $1,000,000 each.

Benefit of River Improvements

By M. C. Garber

Madison, Ind., is deeply interested in river, lake and harbor improvements. From the national standpoint the development of these waterways is essential. Germany has achieved her industrial growth during the last four decades largely through the deepening and unification of her waterways. France, Holland and Belgium, England and Scotland have also done much and profited in these directions. The marvelous development and prosperity of the Rhine cities has been the immediate consequence of river and harbor improvement, modern terminals and the removal of hampering restrictions. Business on Rhine boats is conducted according to railroad system.

The construction of the locks at Sault Ste. Marie and the deepening of the harbors upon the great lakes brought into existence that vast inland water traffic which is now the admiration of the world. Brazil's enormous system of rivers is being opened to commerce by the former secretary of the Rivers and Harbors Congress, the able and distinguished Captain J. F. Ellison.

The Panama canal, the most stupendous engineering triumph of man, is about to change the oceanic avenues of the world and enlarge and cheapen commerce. The grand plans for intercoastal waterways along the Atlantic and the Gulf, and the improvements for the Pacific coast are well matured. The work in the Mississippi valley with its 5,000 miles of navigable waterways drags along slowly where it should be expedited and completed. Given the facilities for commerce and it will appear upon the Mississippi river and its tributaries as it did upon the lakes, the Rhine and elsewhere.

Increased business has followed the 9-ft. stage on the Ohio river. Madison has enjoyed the benefit of the dam at Louisville for two summers. It now has, and will continue to possess, the longest unobstructed stretch of the Ohio river from Pittsburgh to Cairo. For fifty miles down and thirty miles up the river from Madison there is and will be no lock or dam, but 80 miles in all of unobstructed channel, 9 ft. deep the year round. The effects are visible already in the uninterrupted schedules of boats from Warsaw, Ky., to Louisville. Gasoline boats from below and above Madison and the Kentucky river land daily at this port, bringing many passengers and much freight. Our local harbor troubles have all disappeared.

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The Smoke Abatement Movement

Efforts toward the abatement of the smoke evil are being put forth with increasing earnestness by practically all the large cities of the country and have resulted in vast improvement in living conditions. To bring about radical changes in a condition so widespread, however, requires much time, patience and conscientious and intelligent application. Changes in existing plants, or the building of new, cannot be brought about arbitrarily or in haste. Intelligent firing will do much; careful selection of fuel will help largely, but scientific furnace construction and equipment will contribute most. The last named, however, involves considerations which have always stood in the way of application to the marine boiler, and which are well understood by all designing engineers and which it is not necessary to go into here. Many attempts at adapting mechanical stoking to the marine boiler have been made with either indifferent success or complete failure and it is probably safe to say that the net results are negligible.

Many cities are so situated geographically that their coal supply, considered in bulk, will probably always be bituminous, others are so fortunately located that anthracite is available on practically equal terms with bituminous. In the first class is Chicago and yet probably no city in the country has accomplished so much toward the elimination of smoke. The results have been attained by a whole-hearted co-operation between the big business concerns and the city government working through its Smoke Inspection Bureau. Starting originally with a relatively small area in the heart of the city and concentrating efforts therein, the zone has been gradually extended until one familiar only with smoke-beclouded Chicago of ten years since would scarcely recognize the city as it is today. Probably 95 per cent of Chicago's fuel is bituminous coal.

Tugs in Chicago harbor have always been among the chief offenders and while on the one hand the improvements in furnace design and operation before referred to have not been available in their case a good deal has been accomplished on the other by insistence on more careful firing and by selection and mixture of fuels. They are, however, still probably the worst offenders in the heart of the city.

It has always been claimed on behalf of the tugs, however, that anthracite coal was not suitable for their use; that their boilers were not adapted to it; that conditions of harbor towing in Chicago, especially in the strong currents and narrow spaces of the south branch, were so severe that anthracite was not sufficiently responsive and that, besides, its cost was prohibitive. The last is, of course, a commercial question and it is probable that the Smoke Bureau will concern itself chiefly with the other objections urged. It is reported that there are some 60 tugs engaged in regular duty in Chicago harbor and the total amount of coal involved, or, rather, the difference in cost, cannot be very onerous since the tonnage involved would probably not exceed 300 tons per day.

The Smoke Bureau, however, it would appear, are now armed at all points with proofs that the claims referred to do not rest on any sound basis. A prominent railroad has recently put into service in Chicago a powerful tug, which in respect of boiler design differs in no way from scores of others. The fuel is buckwheat anthracite and, of course, suitable grates have been provided and means for accelerating draft when required. It is reported that this tug is not only a complete success in every way, with abundant steam under any and all conditions, but is much more economical than if using bituminous coal, direct comparisons being available as to the latter.

As a matter of fact, the objections to anthracite have never really been anything but commercial. Hundreds of tugs are working every day in eastern waters with anthracite screenings. If large stores, hotels, business blocks and manufacturing plants have, voluntarily or involuntarily, spent large sums to abate smoke by availing themselves of devices and equipment which can be utilized in stationary practice if not in marine, it is not likely that Chicago or other cities will long allow a matter of difference in cost of fuel to stand in the way of complete elimination and, tug owners would do well to take thought on the matter.

It is not at all probable that steamers which only visit the port occasionally and burn most of their fuel outside the harbor limits would be interfered with so long as conscientious effort is made to abate the

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nuisance as far as possible and this is not so difficult since most of their time in port is spent at dock.

The Great November Storm

During the past three weeks vessel owners have discussed nothing except the great storm which destroyed so many modern carriers on Lake Huron. Eight ships totally disappeared with all on board. No one knows what happened to these ships except the striking fact that one of them actually turned turtle. The last thing to be expected of a bulk freighter with its great flat bottom was that it should turn turtle. No explanation of this singular catastrophe to the Charles S. Price is forthcoming. It has been suggested that her cargo of coal shifted while she was rolling in the trough, throwing her on her beam's end, and that her empty ballast tanks acted as a lever to turn her completely over. Whatever the cause, it will doubtless be the subject of future technical investigation.

The ships that went down represented not only the best of lake practice, but of British yards as well. Two of the vessels were British tramps and had been out in all kinds of weather in all parts of the world; yet they fared no better than the lake craft. The most reasonable conclusion arrived at by vessel owners is that they were gradually beaten into the trough of the sea, where they rolled so prodigiously, loosening up and taking in so much water as to eventually founder. This is the supposition arrived at from the testimony of the masters that weathered the storm and from the condition of their vessels. What happened, however, is the merest conjecture, because the cargo may have shifted or machinery become deranged, either of which would have been fatal in such a gale.

It must be borne in mind that the situation which existed on Lake Huron was unprecedented. Since the lakes have been commercially navigated, no such condition has ever been met with before and centuries may go by before such a phenomenon may again be experienced.

When all these vessels entered Lake Huron, there was nothing to indicate that the passage of the lake could not be made in reasonable safety. The barometer was unusually low, but aside from that, the weather conditions were not unusual for the time of the year. A northwest gale had been blowing on Lake Superior since early Saturday morning, Nov. 8, and vessels were generally governed by it. On Sunday morning, Nov. 9, this gale died down, with only a 15-mile breeze blowing from the northwest across Lake Huron. Even with a low barometer there would be nothing in such a condition to prevent a prudent master from undertaking the passage of Lake Huron. Even a stiff breeze from the northwest is not a dangerous thing on the course that vessels take in crossing this lake, as they are under the lee of the land. As the morning progressed, however, the wind increased, shifting to the north and northeast until by noon it was blowing from the northeast with great velocity. The obvious thing for an upbound ship to do would be to head into it, in the hope of reaching the shelter of the east shore, and that is probably what they all did. They were probably defeated in doing so by the continued and unprecedented violence of the elements. As a rule, wind of that velocity does not last over four or five hours, but the wind of Sunday, Nov. 9, blew steadily for nearly 16 hours at an average velocity of 60 miles an hour, with frequent spurts reaching a maximum of 79 miles an hour, making tremendous seas, which followed each other in quick succession, usually three waves coming along one right after the other, and the battering that the ships received from these quick successive blows must have been terrific. The vessels that ran with it had their after quarters crushed and their engine rooms filled with water from the following sea; vessels that headed into it had their forward quarters smashed, and in one instance at least, with consequent derangement of the steering gear.

In the case of the H. M. Hanna Jr. it is known that she could not keep her head to the sea, gradually going off into the trough until she was finally carried broadside onto the Port Austin reef. She struggled for ten hours against the storm with that pitiful result. Had she been in midlake, however, the outcome of the struggle would doubtless have been more pitiful still.

There has been some disposition shown to blame the weather bureau, but there is no reason to believe that the weather bureau could have foreseen the unprecedented combination of circumstances, which existed on Lake Huron. The uninformed have also endeavored to blame the owners for sending their vessels out in such weather, being unaware of the fact that all of the owners leave the navigation of the ship entirely to the discretion of the master. The only instructions given to him are that he shall consider the safety of the vessel to be his first consideration and that dispatch is secondary to the safety of lives and property entrusted to his care. He is the sole and absolute judge of weather conditions and the standing order of the owner is that he shall remain in port if, in his judgment, the weather conditions are such as to jeopardize the lives and property entrusted to his care. It has been shown that no such condition existed on Lake Huron on Sunday morning, Nov. 9.

As soon as the dreadful result of the storm was realized, the Lake Carriers' Association through its Welfare Committee organized a beach patrol and did everything possible to recover bodies of lost sailors and to send them to relatives. Meanwhile death benefits were promptly paid and private subscriptions started for the relief of the bereaved families. As soon as it can be established that the sailors were actually aboard the ships, death benefits will be paid to the families, whether the bodies are recovered or not. The private fund raised will be distributed in proportion to the actual need of the stricken families.

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America's Greatest Waterway

Such is the Tribute That One Advocate Pays to the Missouri River

By Charles E. Deland*

WE WISH to draw attention to the greatest internal waterway upon the American continent.

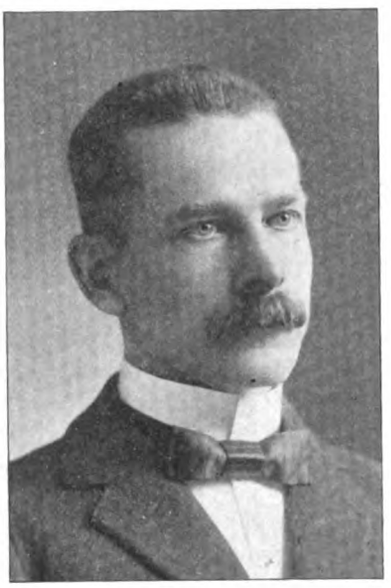
It is the Missouri river; upon whose bosom the trade-pioneers of the west-northwest founded the first great fortunes of individuals and communities. That enterprise extended from New Orleans to the Canadian possessions of England on the Saskatchewan, when the fur trade was the road to wealth and the cordelle was blazing the way for the steamboat. That trade, born with the nineteenth century, had its grand center southward at St. Louis, whose two principal up-river bases were Old Fort Pierre Choteau (within rifle-shot of whose site the writer sits penning these lines) and Fort Union at the Yellowstone's mouth.

And the interests, present and prospective, founded upon that trade furnished the main stake in the American-British struggle for dominion in the far northwest, the outcome of which settled our national boundary line and saved to the United States the Oregon territory and the Columbia river. That contest involved, on its broader lines, at the southern border, the free navigation of the Mississippi and the ultimate acquisition by our government of the vast Louisiana territory—for shrewd Bonaparte saw that France would lose it to England if force were the arbiter.

And when this nation set out to fasten forever her grip of possession upon this new domain the thoroughfare over which Lewis and Clarke explored it to the mountains was this great waterway. And when they left behind them her branches on the backbone of the Rockies, they were almost in sight of streams, soon to become wide and powerful, that formed the main fork of the Columbia.

It is but 470 miles on present travel lines from Great Falls, Montana, head of navigation on the Missouri, to Lewiston, Idaho; from which two points large river craft may ply—one line to the Gulf of Mexico, the other to the Pacific.

Now take a map of North America and draw lines thereon from points on the Canadian Pacific railroad west of the Red river,—first to the Missouri river where it courses nearest to the International boundary line, say in eastern Montana; then from the same points to Duluth, the west end of the Lakes system; and again from the same points to St. Paul, head of navigation on the Mississippi. This important traffic fact appears, viz.: That the rail haul from the Winnipeg basin to the Missouri river is but from one-half to one-fifth as long as it is from the same points to either Duluth or the Twin Cities. And the general course of traffic from that basin to the Missouri, thus illustrated, is essentially that of the Indian and fur-trading era of a century ago.



CHARLES E. DELAND.

Charles E. DeLand was born on a farm in Oneida county, N. Y. While a young man he removed to Galesburg, Ill., where he studied law. He located in Pierre, S. D., in 1883, where he has practiced ever since. He is one of the directors of the State Historical Society of South Dakota, and has contributed many papers bearing upon the history of the state. He was a charter member of the Missouri River Improvement Association, founded in Omaha ten years ago. He was similarly connected with the work of the Missouri River Navigation Congress, organized at Sioux City four years ago and is still the vice president of that organization. He is the author and publisher of several books upon law practice.

The Missouri river, regarded as extending to the Gulf, is 4,220 miles in length from its ultimate head. From the head of navigation at Fort Benton, Montana, to its junction with the Mississippi substantially at St. Louis it flows 2,285 miles, and the 1,258 miles thence to the sea makes its navigable length 3,543 miles. It is in fact navigable for substantial river craft a considerable distance above Great Falls.

And what of the character of its navigability? Such a question would not be propounded by any one at all familiar with the stream. General (then Captain) Hiram M. Chittenden, Corps of Engineers, U. S. A., in his exhaustive work, "History of the American Fur Trade of the Far West," who for many years made a study of the engineering and navigation features of the river while at the head of the engineering department of the Missouri River Commission, says: "From this point (head of navigation at Fort Benton) the river descends like an interminable staircase to the level of the sea, and with so gentle a slope that great boats can ascend it the entire distance." He ranks it "one of the most remarkable streams upon the globe. Its source is farther from the sea than than of any other." Again: "Of all the western rivers the Missouri was by far the most important to the trade." And as further proof,—substantiating the views of the earliest explorers and pioneers of the two great waterways to the effect that the Missouri is the main stream to the Gulf and the Mississippi its tributary,—Chittenden might be further quoted wherein he declares: "The physical characteristics of the Missouri river over the navigable portion of its length are the same as those of the lower Mississippi."

What of the drainage of these two great waterways? Say that honors are even below their junction; the Mississippi thence is 1,024 miles long up to St. Paul, and her watershed is about one-fourth the area of that of the Missouri, whose vast expanse encroaches upon Canada and embraces all territory westward to the Continental Divide of the Rocky mountains.

Now distances become staggering and trade lines extend to the extremities of the globe, involving commerce

*Vice president for South Dakota, National Rivers and Harbors Congress.

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in richness baffling imagination and cosmopolitan as the wide world. Let us view this prospect from the point on the Missouri where those drawn lines unite her with the Canadian Pacific.

From that point on the Missouri to the northern line of British Athabaska the distance is the same as from the same point southward to Kansas City, Mo. Think of that wide domain in the Winnipeg basin whose products, large in magnitude and but beginning to develop, are naturally tributary to the commerce of the Missouri. Nearly a dozen rail lines now branch thitherward from North Dakota and eastern Montana. This, however, is but a local phase of her primacy in the general connection. The western termini of all the Dominion railways are at coast points farther west and nearer the Orient than are those of the American transcontinentals. Thus the traffic to and from the Orient via Canada is forever at advantage over our lines, whether merely east-and-west traffic is considered, or that in connection with the interior north-and-south commerce, whose trend and magnitude are foreshadowed by the operation of the Panama canal. And competition between these two sets of railway systems must advantage all points on the Upper Missouri.

The Missouri and the Mississippi are thus to become tremendous avenues of international as well as of internal commerce in a new and expanding trade movement which will change the whole system of North American continental carriage of commodities into the destined dominant north-and-south trend.

Lakes to the Gulf

Into this grand movement will enter the Lakes-to-the-Gulf Deep Waterways, connecting the lakes with the Gulf-Atlantic and the Panama canal, and with the Mississippi and Missouri rivers. In this race the Missouri will be a prime factor.

But as the battle-line of the coming world-trade is the Pacific seaboard, the interior waterway nearest that coastline must become sovereign in trade-dominance. We have seen that that thoroughfare is the Missouri, not the Mississippi. And is not the slogan "Missouri River Rate" becoming relatively more common?

Already St. Louis, Kansas City, Atchison, St. Joseph, Omaha and Sioux City mark the mighty growth of Missouri valley commerce. Yankton, Chamberlain, Pierre and Mobridge in South Dakota, Bismarck, Mandan, Williston, in North Dakota, and Fort Benton, Great Falls, Helena and Butte, in Montana, register the later developments northerly to the mountains.

Again: The rail haul from the upper Missouri at Pierre and at Bismarck to Duluth is substantially but half the distance from those points to Chicago; while the water-rate from those two lake points to Cleveland and Buffalo are substantially the same. Here is another advantage to the upper Missouri valley on east-and-west traffic. And when Hudson bay shall—as it will—furnish another ocean competitor to and from Europe, proximity of the Missouri to Canada gives her another point in the scale of supremacy.

The Panama Canal

And the revolutionary effect of the Panama canal on international coastwise and trans-oceanic trade will bring the entire Mississippi-Missouri valley carrying trade into intense competition with Pacific steamship lines to southern-Orient and beyond, and along great stretches of the coastlines of both Americas and with Atlantic lines to and from Europe in emptying out to foreign markets our interior productions and bringing in return cargoes.

And when transit developments now fast advancing toward killing time and reducing cost shall render dumping of cargoes from river into ocean-going fleets a thing done in the wink of the eye, and cars are emptied into and filled from them by similar processes, what wheel in all the machinery of transportation to and from the ends of the earth will challenge the faculty of the Missouri river, having such handmaids north and south as are herein indicated?

Since the steamer Yellowstone went up from St. Louis to Fort Pierre in 1832, river craft have plied the Missouri all the way to Fort Benton, doing the will of commerce for trade in furs, with the Indians, and answering the call of military posts, and later the demands of pioneer settlement and founding of cities and states. When the writer came to Pierre thirty years ago he beheld boats coming and going between Omaha and the head of navigation. The Benton Transportation fleet (now of ten boats) has plied from Bismarck. Several Pierre-owned boats have for years operated here and above to the Yellowstone. At Chamberlain another line is still actively in commission.

Are there sandbars? Yes. What stream of importance has not immemorially created them? When a boat of the Presidential fleet recently bound to New Orleans to the Deep Waterways convention struck a bar on the lower Mississippi, no one judged the stream non-navigable therefor. Such ideas are ridiculous. Modern improvements coupled with competent pilotage pave the way for faster and cheaper carriage. The federal government is alive to the amazing possibilities at our door in river traffic. The lower Missouri already is under systematic treatment; modern barges and vast dockages respond to the impetus. The movement is toward the upper Missouri, soon to be similarly handled. Here destiny, presiding midway between the two oceans, will work the miracle of ages in internal and world-wide commerce.

Waterways of New Hampshire

*By Col. O. L. Frisbee**

New Hampshire is one of the superlative states of the Union, with one of the greatest mountain ranges, one of the greatest water powers, one of the finest harbors and some of the grandest scenery, and with some of the most enterprising people in the world.

She is the watershed of all New England, and may well be called the mother of water power of that section of the country, since all of her principal water power rivers rise in New Hampshire. Her only seaport has no counterpart on the Atlantic coast; its only counterpart in the country is Seattle, on the Pacific coast.

New Hampshire cannot boast of all the natural resources of the country, but we can boast of what we have been able to do, through the utilization of the brain and energy of her people. Gathering from distant lands, and distant climes, her raw material, we touch them with the magic wand of energy of trained hand and brain, and they turn out for us a flood of gold, gives us an individual development that has made New Hampshire one of the wonders of the business world.

When we consider, how we have built up a business structure, so great and comprehensive, under the present conditions of our transportation system, we know that when we get cheap transportation from the Atlantic coast canal we will be able to turn the whole state into one large town except the White mountains, which we

*Vice president of the Atlantic Deeper Waterway Association and the National Rivers and Harbors Congress.

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will reserve for the Switzerland of America.

Our abundant water power, skilled labor and fine harbor give us a foundation for both industrial and commercial greatness.

There are 1,500 streams in New Hampshire with minor ponds and lakes. The largest is Lake Winnepesaukee, 72 sq. mi. with an altitude above the sea of 472 ft. New Hampshire has an area of 9,305 sq. mi., including water service of 300 sq. mi. It has 18 miles of sea coast, 10 miles inland from the coast is Great bay, a tidal basin of the Piscataqua extending almost across the state from northeast to southwest, and lacks only 10 miles of connecting with the Merrimac river. This waterway is a part of the system of the Atlantic coast canal from Maine to Florida, which needs only a ten-mile cut from Exeter to the Merrimac river to complete the canal across the state.

A Canal 25 Miles Long

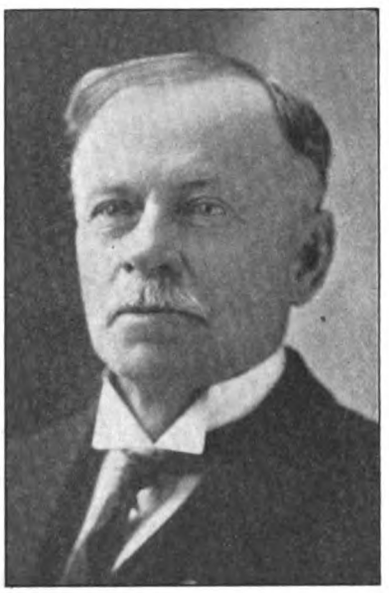
A canal 25 miles long from Great bay, through existing waterways, part way, would extend to Manchester on the Merrimac, this would give that city, and the whole upper part of the state, cheap transportation, so that Manchester, N. H., would get her raw material as cheaply as Manchester, England, her namesake, a condition that does not exist today. Only 33 miles of constructed canal in New Hampshire would complete the Atlantic coast canal, and the Manchester canal.

The Piscataqua river is formed by the Salamon Falls river and the Chochecho river, both water power rivers; during part of the way it is the boundry between the state of Maine and New Hampshire. From Dover to Portsmouth it is one-half mile wide, and a mile wide from there to the sea and very deep its entire length. Six miles above Portsmouth, the waters of Great bay enter the Piscataqua river, and discharges each tide, with such swiftness, that Portsmouth harbor never freezes over.

Only 25 miles from the Piscataqua river runs the mighty Merrimac, which turns more mill machinery than any river in the world, and on its banks has the largest cotton and woolen mill in the world. We want to make this water power and this tidewater handmaidens of each other.

New Hampshire wants the Atlantic coast canal from Maine to Florida, the Manchester canal, slack water navigation for her only seaport.

With her abundant water power and skilled labor, it will be the beginning of making the Granite state the Belgium of America. The canal is no new question in New Hampshire. Our fathers at the beginning of the last century, before New York thought of the Erie canal, were alive to the possibilities of cheap transportation by canals. The whole state was planning to get to the seaboard by canals. The upper part of the state accomplished it by using the Merrimac river and the Middlesex canal and reached the sea coast at Boston from Concord. The eastern part of the state wanted to reach the sea coast, by building a canal from the Connecticut river to the Piscataqua river, a distance of 90 miles, 35 of which was through existing waterways, Lake Squam and Lake Winnepesaukee, and was known as the "Winnepesaukee canal." The legislature of New Hampshire four times granted a charter for this canal, but refused to permit towns through which the canal passed to issue bonds to build the canal. The improvements in New Hampshire waterways, as we have indicated, will make Portsmouth, what she would become, if Winnepesaukee canal had been built a century ago, a port of paramount interest.



COL. O. L. FRISBEE

Col. O. L. Frisbee is a recognized authority on the waterways of New Hampshire and is one of the officers of the Atlantic Deeper Waterways Association and the National Rivers and Harbors Congress. Col. Frisbee was chairman of the public improvement committee of the New Hampshire house in 1911 and led in the fight to get the state to buy the Crawford notch in the White mountains. He is a member of the executive committee of the progressive party.

Water the Public's Highway

*By Edward C. Plummer**

One of the facts too often overlooked by people during discussion of appropriations from the national treasury for the deepening of our waterways, is the fact that such waterways are public ways—they can be used by any citizen who desires.

When appropriations are made to aid in building a railroad, whether state or municipality make such appropriations, this aid goes, necessarily, to build a highway which is from the very nature of the case monopolistic. The railroad company owning the charter is the only company having full privileges there—the average citizen cannot use the rails of this road; he must pay the road to carry his freight over the roadbed which he has helped to build.

The Right to the Channel

But when the government has dredged a river so that there is navigable water therein, every citizen has full right to use this channel for business or for pleasure. If he has a small amount of freight to be shipped to market, he hires a small vessel, loads it, and sends it along as he sees fit. If he has a large amount of freight he has a steamship come at his convenience, loads it as he chooses and sends it away. Any man or firm can send his or its vessel over these national waterways, and thus get a direct return for the money which has been invested therein.

To illustrate: Some of the proprietors of lumber mills in the state of Maine own sail vessels which, as the result of improvements made by the government in the channels of the Penobscot and Kennebec rivers, can sail into the interior of the state as far as Bangor and Augusta, and take cargoes directly from these and intermediate points to Boston, New York, Philadelphia and Baltimore. The cost of transportation of lumber on these vessels is from one-half to one-quarter what it would be by cars; and since vessels of all sizes are available for charter at all times, the millman can select one with a capacity corresponding to the size of the order he has to fill, and the consumer in those cities of destination reaps the benefit of this cheap transportation. Therefore it is money in the pockets of the citizen of New York, Philadelphia, Baltimore and Boston to have the government expend a part of the national funds "building" these waterways. In the

*Vice president for Maine, National Rivers and Harbors Congress.

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same way it is for the advantage of Americans generally to have all practicable waterways made available for traffic—they cost but little to maintain and their use is unrestricted.

To take another illustration afforded by the state of Maine: The vast shipments of potatoes from the county of Aroostook have made the matter of freight charges such a tremendous item that the Bangor & Aroostook Railroad Co. found it would be a matter of the highest importance to make use of water transportation to the largest possible extent; and so, in the Penobscot river, it constructed one of the largest freight piers in this state; the channel was dredged by the government so as to permit large steamships to reach these piers, and now cargoes of potatoes go directly by water from this pier to the metropolian markets. Small shipments can be handled by small vessels—this waterway is a public waterway and a public benefit.

Transportation of Grain

The fact that grain can be transported by steamer from Duluth, Minn., to Buffalo, N. Y., for less than one cent per bushel by way of the great lakes, is a graphic illustration of what waterways can do in cheapening the cost of bringing necessities from the producer to the consumer.

A national policy of good roads, enabling the farmer or other producer cheaply to deliver his crops or other products at a waterway landing, and improved waterways, giving cheap transportation of these collected crops or products to central points of consumption, is a policy which will do more to reduce the high cost of living than any other one thing within the power of congress.

Whenever the people generally inform themselves on this subject, legislation giving them these advantages surely will come.

Chesapeake and Delaware Bays

The Increased Transportation Facilities Between These Two Bays—The Nation's Needs

By William H. Heald

THE value of transportation by inland waterways, and deeper channels connecting them with the high seas, is by no means as thoroughly appreciated as the results of such a system justify. The campaign of education which has been carried on, more actively in the past ten years than prior thereto, is, however, showing the result of an awakened and deep rooted public interest. The outcome of a public conviction, that is not combated with the same publicity and frankness as that used by its advocates, almost invariably results in favorable legislation and ultimate success; and the strength of the position taken by advocates of increased facilities for transportation by water, has been but seldom assailed.

The National Rivers and Harbors Congress in adopting a general policy of education, and not attaching itself in any way to individual projects, has made it the center of the public interest which has been aroused by a growing number of enterprises advocating local improvements, that has so far worked to the common good of all. This policy has met with the expressed approval of former Presidents Roosevelt and Taft, and President Wilson, and a noticeable result of such general approval has been to create in the separate localities, interested particularly in their own needs, a less selfish, although not a less active interest, in the promotion of these enterprises. It has added a broader point of view and a wider scope to their interests. There is no reason why the interests of the seaboard, the great lakes, inland waterways and canals, cannot all be worked out in perfect harmony and accord, as part of a national plan for the conservation of all our resources. The approaching completion of the Panama canal will not be the culmination of our national waterways improvement; it will be but the beginning. The pride of country and national achievement will be aroused and will demand further accomplishments of a similar character, although of lesser magnitude.

WILLIAM HENRY HEALD.

William Henry Heald, of Wilmington, Del., was born at Wilmington, Del.; was educated in the public schools of Wilmington, and graduated from the high school in that city in 1880; the same year was appointed national bank of Delaware College and graduated therefrom in 1883; graduated from the law school of Columbian University, of Washington, D. C., in 1888, and the same year was appointed national-bank examiner for the states of Montana, Idaho, Washington and Oregon; commenced the practice of law in 1897 and is still practicing his profession; has for a number of years been one of the directors of the Atlantic Deeper Waterways Association, and a vice president of the National Rivers and Harbors Congress of the United States; was appointed post master of Wilmington by President Roosevelt in 1901, and served one term; was elected to the sixty-first congress and re-elected to the sixty-second congress.

Along a seaboard the cheap and safe transportation of merchandise of considerable bulk has become a problem that cannot be solved by any other method than the deepening of inland waterways, the enlargement of old and the construction of new canals, and also the creation of an efficient terminal and transfer facilities. The policy of an annual consideration of the needs of our rivers and harbors by congress is another wide step in placing these improvements upon a basis of systematic development rather than of sporadical wastefulness. The very large traffic of the class that can properly be termed bulky moving north and south along the Atlantic seaboard, more than a century ago called attention to the value of canals connecting the larger bays and avoiding the very great danger of outside navigation. Canals connecting the Chesapeake bay and Delaware bay, and the Delaware bay and the waters surrounding the harbor of New York

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were constructed and extensively used, but have been allowed to fall into comparative disuse because of the immense growth of the facilities for transportation by rail. The insufficiency of this service, by reason of the enormous demands made upon it, have brought us back to a new use and further development of these canals. One of the greatest of these connecting waterways was the Chesapeake and Delaware canal connecting the Chesapeake and Delaware bays by a canal approximately about 13 miles long, of which 10 miles lie in the state of Delaware and 3 miles in the state of Maryland. The distance from the port of Baltimore to the port of Philadelphia by the outside passage is 320 miles, while the distance from Baltimore to Philadelphia through the canal is only 136 miles, a saving in distance of 184 miles. The saving in hours by steamer over the same route is about 16 hours; not by any means an inconsiderable saving. The canal as it now exists has a depth of only 7 ft. through the lock, and in consequence its usefulness is limited; but even with such restricted possibilities the present tonnage of the canal has averaged for the past five years 716,644 tons, upon which the average toll collected was 22¾c per ton. These facts supported by a great number of additional ones, not necessary in a brief article of this kind, have pointed out the advantages that will accrue by deepening and widening this canal. The known tonnage passing north and south that could with profit make use of a deeper and wider Chesapeake and Delaware canal is estimated by the government engineers to be about 2,576,322 tons of an aggregate estimated value of $14,170,239. It is rather interesting to note that this traffic is about evenly divided between the north and south bound traffic, the northbound traffic being estimated at 1,107,414 and the south-bound at 1,430,208 tons.

National Interest

At the time of the original construction of this canal, its importance was considered of national interest and value to such an extent that the government appropriated the sum of $450,000 toward its construction, and became a stockholder to that extent. The canal was completed and put in use on the fourth day of July, 1829, and from that time until the present has been in operation, serving in a limited way a traffic that has, by reason of the increased size and draught of vessels engaged in transportation, wholly outgrown it. By reason of this the value of a tide water canal between these bays, able to accommodate the largest vessels carrying cargoes between the north and south, has been of constant agitation for many years. That the government should take over the Chesapeake and Delaware canal either by condemnation or purchase, has been just as persistently urged and apparently with success, for in the report of the chief of engineers of the United States army, made in 1912, the acquisition of this canal by the government and an immediate increase in its depth to 12 ft. was advocated. An increase in depth to 12 ft. for this canal must not, however, be accepted as a measure of its prospective value to commerce, nor indeed, as accommodating the present traffic. A depth of at least 25 ft., corresponding in some reasonable degree to the depth of channel in the Chesapeake bay and the Delaware river, must be secured; this, however, will ultimately follow the acquisition by the government, and an initial depth of 12 ft.

Deeper Waterways Association

The supporters of this project have been consistent in the support they have given to the Atlantic Deeper Waterways Association, which association is distinctive in that it is advocating the "project" of an inland waterways from Boston to Florida, and of this project there is no more important link than that of the canal connecting the Chesapeake and Delaware bays. The success that has so far been achieved in urging that this canal should become a government waterway is attributable to a large extent to the persistent attitude of the Atlantic Deeper Waterways Association, as well as the incontrovertible merit which is in the project itself. There is abundant reason to believe that the present congress will take the step advocated by the engineer department, and several times urged by independent commissions appointed under authority of congress, and authorize the taking over of the Chesapeake and Delaware canal by the national government. In the construction and maintenance of these inland waterways I see no good reason why the experience acquired in the construction of the Panama canal and some of its equipment should not be turned to the material advantage of the government by being used in the deepening and widening of our waterways, wherever it can suitably and economically be done. The policy of permanent dredging plants in harbors demanding almost continuous attention has been found so satisfactory to shipping, and economical to the government, that an extension of that policy under the competent direction of the engineers corps should bring satisfactory results.

Deep Draught from Lakes to Ocean

By James Bardon

In response to your request of recent date for some expressions with respect to the work and objects of the National Rivers and Harbors Congress, the annual session of which will be held in Washington in a few days, it is safe to say that the opening of the great lakes to ocean navigation, by deepening and enlarging the Welland and St. Lawrence river canals, takes the lead in this locality of all other waterway questions.

The dream of years that at some period boats from every ocean and clime would dock at Superior and Duluth, at the head of Lake Superior, more than two thousand miles from the Atlantic into the heart of the continent, seems to be within realization in the next few years, through the energy and enterprise of our Canadian cousins. The great lake cities of Milwaukee, Chicago, Detroit, Cleveland, Buffalo, and in fact all harbor cities on the lakes, are alike interested with Superior and Duluth in the early opening of this great waterway. The Rivers and Harbors Congress will be wise, and neighborly, if it can devise a way to speed this important work.

In anticipation, plans for the wharfage and handling of ocean business are being considered at Superior and Duluth, and doubtless at other lake cities. And the United States government engineers are understood to be giving attention to the subject.

While the Duluth-Superior harbor has fared well at the hands of the government, and is now one of the best for safety, room and depth, yet to keep pace with growth and business, considerable further work, mainly in extending deep water channels and enlarging basin areas, is essential.

There is an active and growing sentiment that the time is at hand when the general government should devote some of its resources to improving small harbors at towns, villages and settlements, to aid and encourage the navigation of minor craft operating for fishermen, timbermen, farmers, fruit raisers, and the like, as well as for pleasure.

The wisdom of providing ample lights, buoys and other guides and safeguards, and also telegraph, wireless and telephone systems on all navigable waters is too apparent to invite argument.

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Interstate Waterways League

Progress of Work Upon the Intercoastal Canal from the Mississippi to the Rio Grande

THE ninth annual convention of the Interstate Inland Waterway League was held at Orange, Texas, on Oct. 18. The following officers were elected: C. S. E. Holland, president, Victoria, Texas; Henri L. Gueydan, vice president, Gueydan, La.; G. J. Palmer, vice president, Houston, Texas; Leon Locke, general secretary, Lake Charles, La., and Roy Mitchell, assistant secretary, Corpus Christi, Texas. The accomplishments of the year were set forth in the following report from the secretary:

This year has shown great advancement in the work of the Interstate Inland Waterway League. Since the Palacois convention of nearly one year ago the section between Matagorda and Velasco has been completed, thus opening to traffic the Galveston-Corpus Christi section for its full length. The immediate use of this section has justified all claims made concerning its value. Actual dredging is in operation between the Calcasieu and the Sabine, two dredges being used by the contracting company which has undertaken the 22½-mile stretch at a rate of 6.6 cents per cubic yard for excavation and a guarantee to complete the section within 20 months. The canal when completed will be practically 7 ft. deep and 60 ft. wide. At the present rate of cutting the work will be finished well within the period of the contract, possibly within a year from the date of beginning which was in September.

Sabine-Galveston Section

The Sabine-Galveston section which has so long hung in the balance has been approved through the recommendation of the special committee of the board of engineers, which committee was composed of Lieut.-Col. Lansing H. Beach and Lieut.-Col. Harry Taylor, who, with Major T. H. Jackson, of the Dallas district, conducted a hearing in Beaumont on May 10 of this year. At that hearing all the interested communities were represented, and with some of the officers of the league presented arguments and figures supporting Col. C. S. Richie, of Galveston, to whose clear, succinct report and recommendation the credit for our success in that section must be given.

In June the celebration of the completion of the Galveston-Corpus Christi section, above referred to, was held in the former city, and was an occasion for general felicitation as well as for plans for the full use of that valuable section. In January of this year a meeting was held in the Grunewald hotel in New Orleans and was attended by representatives from the interested sections. Mayor Behrman, ex-Governor Sanders and other gentlemen were present and all urged immediate action on the important link between New Orleans and Morgan City. A large delegation was chosen to present the views of the meeting to Major Schulz, engineer in charge, at a hearing specially granted by him. The result of this conference was a complete understanding with the engineers and the fullest co-operation has been the result.

Before congress opens again in December the league hopes to see the report of the chief of engineers in which, without doubt, there will appear the recommendation by that officer of the canal in its entirety from New Orleans to Brownsville.

The present status of the canal may be summarized as follows. From the Mississippi through the Plaquemine locks, Plaquemine bayou and connecting streams to Grand river and the Atchafalaya, thence to the Teche; completed. From the Teche to Cote Blanche and Vermilion bays through Hanson canal, leaving the Teche at Garden City. This canal will soon be formally surrendered to the United States for the consideration of $65,000, which sum is available. Through Cote Blanche and Vermilion bays, Schooner bayou and constructed canal to White lake, thence to Grand lake, thus making the chain complete from the Mississippi at Plaquemine to Mermentau.

Mermentau to Sabine

From the Mermentau to the Sabine there is available the sum of $417,450, of which amount $27,450 was contributed by citizens of Orange, Vinton, Lake Charles, including some land owners between the Calcasieu and the Sabine, (one holding company, The Teutonic Land & Development Co., giving $15,000) raised to secure a change in the route which involved a greater cost than the $100,000 appropriated for that section. As stated the Calcasieu-Sabine section is now being constructed. The remaining $290,000 is available for use between the Mermentau and the Calcasieu, and work will begin as soon as the necessary rights-of-way are secured.

The section between the Sabine and Galveston, approved, now awaits the action of Congress to provide the needed funds.

Between Galveston and Corpus Christi, as stated; completed.

From Corpus Christi to Brownsville the recommendation has hitherto been withheld, but confidential advices indicate the recommendation of that section in a forthcoming report.

An Altruistic Work

By A. H. Devers

The work of the Rivers and Harbors Congress is really an altruistic work. My reason for saying this is that the congress works for the entire country, and has never shown any favoritism for any particular section. Many organizations have been started which were presumed to be national in their character, but have degenerated through special influences into becoming local. Owing to the able management of this congress, this work has remained strictly national in its character and has been for the benefit of the country as a whole without giving undue prominence to any particular section or locality.

The improvement of all the rivers and harbors of the entire United States, which the engineers of the army deem worthy of improvement, is the work which the congress has set out to accomplish, and has thus far been of most wonderful help in accomplishing. The annual meetings of the congress, coming as they do right at the beginning of the sessions of the United States congress, have been productive of great good because of the attendance at these meetings of representative men from all over the country, each one of whom is intent on helping his own section, but also as enthusiastic and earnest in his help of all other sections of the country.

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Equipment of Wharves

Importance of Keeping Open Landward Approaches to Waterfronts

By Dr. George C. Pardee

THE waterways have in all ages borne the bulk of the commerce of the world. Transportation in modern times has been divided between the railway and the steamship, but the ocean continues to be the great equalizer of expense, water carriage costing on the average from one-tenth to one-sixth as much as transportation by rail. This fact alone is sufficient to emphasize the importance of the work of the National Rivers and Harbors Congress. The fact that railways always make lower rates when subject to competition by water than where such competition does not exist, is undeniable and supplies an unanswerable argument in favor of maintaining conditions on rivers and harbors which will prevent combination between rail and water carriers, and the consequent advance of rates. This is set forth in No. 4 of the findings of the Inland Waterways Commission, as follows:

Decline in Navigation

"While the decline of navigation in the inland waterways was largely due to the natural growth and legitimate competition attending railway extension, it is also clear that railway interests have been successfully directed against the normal maintenance and development of water traffic by control of waterfronts and terminals, by acquisition or control of competing canals and vessels, by discriminating tariffs, by rebates, by adverse placement of tracks and structures and by other means."

It is in pursuance of the policy of giving to the people of the United States who are bearing the entire expense of the construction of the Panama canal, the full benefits of a shorter water route between the Atlantic and the Pacific coasts that an effort has been made to prevent a combination between rail and water carriers so as to eliminate the effect of competitive water rates.

It is because the canal is an American water way, through American territory, paid for by the American people, that the United States government is clearly within its rights and is pursuing a sound policy in the encouragement of American shipping by exempting our own vessels engaged in coastwise commerce from charge for tolls through the canal.

That the benefits of the completion of the Panama canal may be extended to all parts of the country, it is important that this great project shall be supplemented by adequate provision for the improvement of rivers and harbors, particularly the rivers and channels which convey commerce inland.

The Pacific coast, which will receive perhaps the greatest benefit of any portion of the globe by the completion of the Panama canal, has comparatively few great harbors. San Diego, Los Angeles, the Bay of San Francisco, Eureka, Portland and Puget Sound are the points at which commerce will converge. While most of these are natural harbors, there is scarcely one of them which does not require the supplemental agency of the government in supplying facilities for the safe entrance of shipping and the economical handling of commodities.

The extension of the work of the coast and geodetic surveys, the construction of lighthouses, the placing of buoys, the adequate maintenance of life-saving stations are all-important, but the government should pursue a liberal policy in appropriations for the improvement of rivers and harbors.

Two Great Inland Waterways

California has but two great inland waterways, those of the Sacramento and San Joaquin rivers which, in addition to its harbors, require government aid. At the present time the Sacramento affords a great commercial waterway to the city of Sacramento and the San Joaquin to the city of Stockton. It is possible, with federal co-operation, to extend the navigable mileage of these rivers further into the interior, and every mile to which river navigation is extended serves as an equalizing factor in the cost of rail transportation.

After all that can be reasonably asked for is done by the federal government, there remains a great deal of important work to be done by the cities on California's harbors and waterways.

The United States government cares for the streams and channels from the pier heads outward. But if there are deep water channels and ample fairways there may still be no water-carried commerce. There is absolute need for properly equipped wharves, for adequate and open approaches to these, from the landward side. There must be up-to-date equipment of wharves with warehouses, railway tracks, cranes and derricks for handling freight before there can be that freedom of passage between land carriers and water carriers, necessary to the fair competition of the waterways routes.

Unimpeded Road for Traffic

Splendid deep waterways, with a barrier of a few feet in width represented by improperly designed and built wharves, of by landward approaches controlled by or in the interest of railroads will nullify all the good that the waterways might be expected to bring to the commerce of the country.

In other words, there must be an unimpeded road for traffic from the land to the hold of the vessels to make the waterways effective.

The economic value of water routes for commerce lies in the cheapness with which freight can be handled. If the cost of one-sixth to one-tenth per ton per mile as compared with railroad carriage is to be nullified by unnecessary cost of handling at the wharves, then the waterways cease to become, or they never get to be, competitors with the railroads.

The difference between adequate handling facilities in loading and unloading ships as compared with old-fashioned ways and machinery has been shown to amount to as much as 26 to 29 cents per ton. This amount of waste in handling represents the cost of transportation of a ton of freight 40 miles by railroad. That is, it operates as a handicap of just 40 miles in favor of the railroads in the competitive race for handling the commerce of that particular section.

The total amount of freight handled between the Pacific coast and the Atlantic coast of the United States

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carried across the Isthmuses of Tehuantepec and Panama, during the eight months of the calendar year 1913, ending with August amounted to about 1,200,000 tons, the figures for the year would be 50 per cent greater, or about 1,800,000 tons. Now, most of this traffic between the east and west coasts of America is subject to this expensive handling at wharves. In other words, it is subjected to the tax that would carry it 40 miles on its journey across the continent by railroads. In dollars and cents it means a tax on this commerce of $540,000 annually. Every other impediment placed in the way of rapid, cheap and proper handling of freight to and from the wharves where the water route carriers can become effective as competitors, with the high cost rail carriers but adds to the crippling of the efficiency of the waterways. The one illustration of equipment for handling freight at wharves will serve to point the moral.

The importance of all this lies in the fact that it is the right of the people who produce the things carried back and forth between the two coasts, and the people who ultimately buy and consume those articles to have this service of carriage performed as economically as possible.

It is hardly necessary to draw the conclusion for the reader that in the great work of utilization of the waterways of California so that they may give the best service to the people, it is incumbent upon the state and municipal governments and the individual citizens to see to it that the plans of the federal government are supplemented by local attention to the all-important feature of providing and keeping open the landward approaches to the waterfronts.

Harbor Projects of Milwaukee

When Finished Milwaukee Will Have One of the Best Harbors on the Lakes

By William George Bruce*

THE recent harbor history of this city presents some interesting and at the same time instructive phases in the progressive stages of improvements planned and those accomplished. It is a well known fact that Milwaukee has always protected its harbor interests to a reasonable degree. It has not, however, rounded out all its opportunities for harbor development. Some things that might have been done earlier are still left undone. Let me explain.

Several years ago the resident United States government engineer, Major Judson, stated before the Merchants' and Manufacturers' Association that Jones island, which in reality is a peninsula and which extends to the mouth of the harbor, furnished the key to Milwaukee's future harbor development.

Solved Physical and Financial Problem

The idea was taken up by the commercial organization and finally submitted to the city council. This body proceeded at once to secure experts to work out the scheme of developing the island for dock and harbor purposes.

The council secured a report from Isham Randolph, the Chicago engineer, which set forth the physical or engineering problem involved, made clear the financial and legal problems involved and secured an affirmative vote at a popular election of a bond issue of $250,000 to be devoted to the purchase of the island.

While the vote of the people authorized the city to issue the bonds, it still remained for the mayor and common council to say whether this should be done or not. They had the final vote in the matter.

By this time the administration was in the hands of the Socialist party, and when the champion of the harbor project pressed their case the administration turned them down, having a large park project in hand which they gave preference.

The Socialists made the point that the friends of the harbor project had failed to prove the necessity of the proposed improvements, and at the same time referred the matter to a harbor commission to be made up of prominent citizens irrespective of party affiliation. This for the time being took the matter out of the hands of the council committee on harbor affairs, and while the commission was to be only an advisory body it was not believed that action should follow except upon its recommendations. At any rate it meant more delay.

The new harbor commission realized that if progress was to be made it would have to take a year or two to assemble all the data and information on the subject which now was in a fragmentary and scattered condition and collate them into accessible and argumentative form.

It here became evident that while the physical feasibility and the legal and financial phases had been worked out that it still remained to demonstrate the commercial utility side of the whole project, namely, the purchase of Jones island and the deepening and widening of the Kinnickinnic basin lying to the inner side of the island.

This implied a series of important questions. What are the present dock facilities? What dock property is still available for shipping purposes? What has been the percentage of growth in our water route shipping? How is Jones island to be utilized? Will it be worth all that it will cost? When will its use become necessary? Prove your case.

This involved an exhaustive and laborious review and research of the entire situation and brought into play an array of facts and figures never before assembled on the subject. The commission, however, was equal to the task and was enabled in its reports of last and this year to demonstrate its case most conclusively.

Convinced the Doubting

During the period of three years when the commission was first appointed the local administration changed from Socialist to non-partisan, but the present Socialist members of the common council have been convinced that the commission is dealing with facts, and that its arguments in behalf of the purchase of Jones island can no longer be successfully combatted.

*President Milwaukee Harbor Commission.

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During the past ten years the water route tonnage has been nearly doubled. The available dock property has practically reached a point where new and at the same time ample docking will be impossible. Many miles of strips of land lying along the rivers and at the same time fronting business streets are practically lost to the water shipping interests because their street fronts have become too valuable for commercial purposes.

The mills of justice grind slowly but it sometimes seems that local legislative bodies are even more seriously afflicted with procrastination. This is largely due to the many-sided demands upon them for funds and the difficulty to decide between several laudable public projects.

The public sentiment which has been aroused in the direction of harbor improvements is likely to induce the present administration to accept all the recommendations made by the harbor commission. A committee of one hundred citizens appointed by the Merchants' and Manufacturers' Association, made up of representatives of the various commercial and civic associations will back the commission and bring pressure to bear upon Mayor Bading and the city council, who are friendly to the project, to provide the necessary appropriations in next year's budget.

With the improvements contemplated Milwaukee will have one of the best harbors on the Great Lakes. It will not only enable larger crafts to traverse rivers and slips, but will practically double the capacity for water route traffic and at the same time permit greater convenience in entrances and clearances of all sizes of vessels.

The New Barge Canal

By E. W. Douglas, Director

New York, as a state, is taking a keener interest in waterway transportation than ever before in its history. The construction of a system of canals for barge navigation undertaken by the state, the deepening of the Hudson river, the project of the Atlantic Deeper Waterways Association for a protected intra-coastal waterway from New England to Florida, now well under way, the improvement of the great harbor of New York and other harbors and waterways of the state by the federal government, have combined to produce this and to create a new vision concerning the possibilities of trade expansion in this section of the east.

In proportion to its population and resources, the building of the new barge canal by the people of New York state is a far greater achievement than the building of the Panama canal by the United States. Our immediate duty is to make this canal commercially profitable to the people of the state who contributed every penny of the $127,800,000 expended in its building.

Owing to its geographical location, what is known as the Capital District of the Empire State (the region which embraces Troy, Albany, Cohoes, Watervliet and several other adjacent cities and towns) is destined, upon the completion of these various waterways, to multiply its already important commercial advantages many hundred fold.

Its Commercial Importance

Commercial importance of this capital district can be readily understood when it is stated that within a radius of 16 miles we have the most thickly populated district outside of New York and Buffalo, while within 200 miles encircling the capital district there is a population of over 25,000,000 of people.

A great terminal is about to result, for here opposite the city of Troy the two great canals and the Hudson river converge. To the north a short cut via the Champlain canal to Montreal offers the Canadian provinces and the great Canadian Northwest a new route to New York, the Atlantic seaboard and Europe, a tremendous saving in time as opposed to the St. Lawrence outlet. Westward the main artery of the barge canal leads on to Buffalo, the Great Lakes and the vast commerce of the middle west and our own great northwest. To the south of us, a distance of 150 miles, is New York harbor. With a depth of 30 feet the major part of its length and the construction of a deeper channel now already under way in the Hudson river between Hudson and Troy to meet the requirements of the barge canal system and the further deepening of the upper Hudson which must come in the near future, an interchange of rail, barge and ocean-going freights will inevitably occur at this point, and Troy at the head of tidewater and navigation, Albany and the entire district will become a vast assembling point and distributing section, extending trade in every direction as well as facilitating business via the Panama canal.

Troy is essentially a manufacturing and industrial community with a name known around the world for a score of products each the best of its type produced in America. Its accessibility and its avenues of commerce have lead many manufacturers to come to it, and in view of the increased advantages to be secured in the near future, this cannot but continue.

As the gateway of the north, it is an important center for all classes of transportation. Goods destined for the seaboard, the west or the south, from Canada, Vermont, Northern New York and parts of Maine, New Hampshire and Massachusetts have to pass through Troy. It is a commercial center at present with a territory of half a million population. The area over which Troy could do business on waterways transportation (with its attending saving of freight rates) will be enormously increased upon the completion of the waterways of the state and the Atlantic Intracoastal canal, and which the Hudson in turn will feed, and as other connections are made and the whole territory east of the Rocky mountains is covered with a network of waterways, such as is being advocated and worked out by the National Rivers and Harbors Congress and numerous auxiliary associations, it will be difficult to overestimate the benefits which will come to points all along the line, including the cities on the Hudson river.

In view of the initiative taken by New York state, in providing the barge canal, a right of appeal to the federal government for liberal appropriations in furtherance of its interests has been well established.

However slow or unsuccessful we may have been in the past in pressing our claims for national recognition, an altogether pull for a fair share of waterways funds is now being made by the state which contributes more to the revenue of Uncle Same than any state in the Union, the Empire State of New York.

The annual report of the Panama Railroad & Steamship Co. for the year ended June 30, 1913, shows net earnings of $2,179,175. The steamship company which is operated in conjunction with the Panama railroad shows net earnings of $221,000, as against a deficit of $201,000 for the previous year. The steamship line enjoyed very good patronage during the year.

The H. W. Johns-Manville Co. have established their Baltimore office at No. 207-13 E. Saratoga street, occupying the whole of a six-story building.

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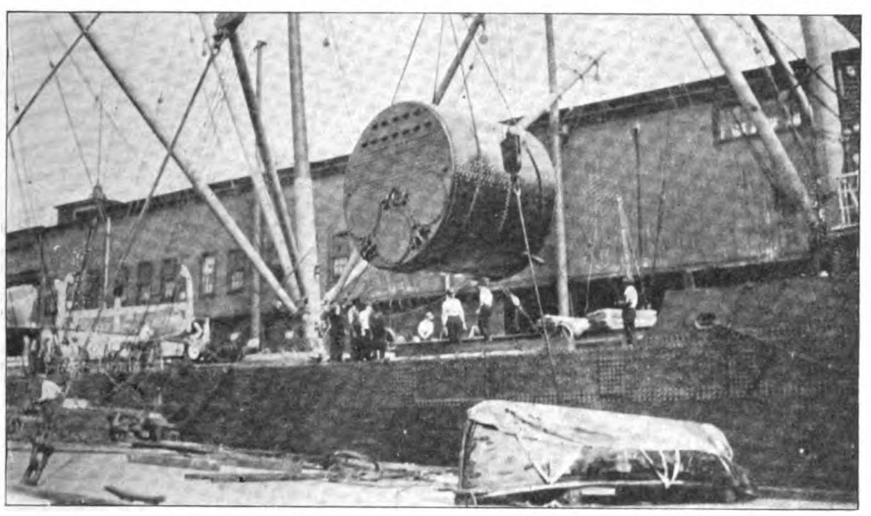
Large Boiler for Panama

The Newburgh Steam Boiler Works, Newburgh, N. Y., recently shipped a large boiler of interesting construction to the Isthmian Canal Commission at Panama. The accompanying photograph shows Merritt & Chapman's 100-ton lighter lifting the boiler aboard ship. The boiler was 15 ft. diameter by 14 ft. long with three furnaces and built for 180 lbs. steam working pressure under Lloyds requirements. The boiler weighed about 60 tons, and as this was in excess of the steamer's cranes, the loading derrick of Merritt & Chapman was used to hoist it on board. The boiler was too large to be lowered through the steamer's hatches and had, therefore, to be carried on deck. As no dock equipment existed on the Isthmus capable of handling such a weight, the tube holes, furnaces and steam outlets were plugged and the boiler was rolled from the deck to the steamer into the sea where it was towed ashore.



LOADING A 90-TON BOILER FOR THE ISTHMIAN CANAL COMMISSION

Lake Erie Ore Receipts

Out of a total shipment of 6,521,884 tons of iron ore during October, 5,220,673 tons came to Lake Erie ports, distributed as follows:

Port.	Gross tons.
Buffalo	692,362
Erie	136,397
Conneaut	1,166,031
Ashtabula	1,035,970
Fairport	136,319
Cleveland	1,213,532
Lorain	468,448
Huron	112,140
Sandusky	.....
Toledo	160,018
Detroit	99,456
Total	5,220,673

The steamer I. W. Nicholas, stranded at North Point, Lake Huron, has been abandoned as a constructive total loss.

Order in Waterways Improvements

*By G. Hatton**

"Order is God's first law!" That so palpable a truth should have been so long ignored by the governmental wisdom of as great a country as the United States in the appropriation and expenditure of the millions of money applied to the improvement and maintenance of its great natural waterways, seems incredible; and yet, such was the fact until the National Rivers and Harbors Congress had for some years conducted its campaign of education and enlisted an enlightened public sentiment and cooperation in this worthy cause.

Appropriations were made at random, rather than in strict accordance with well-matured, impartial and comprehensive plans formulated by scientific and responsible experts. They were made according to the "pork barrel" method, and manipulation was often-times more potent than merit, in securing necessary appropriations for the all-important improvement of our waterways. Long intervals between the appropriations was the prevailing custom and a river and harbor bill was introduced about every three years. Owing to the extent of our country and its great diversity of interests, the struggle of the different sections for recognition in these bills was terrific; envy, hatred, malice and all uncharitableness were engendered, and it is impossible for one unfamiliar with the facts to appreciate the difficulties of such a situation. Work for which there was a partial appropriation was commenced and sometimes began to decay before another appropriation could be obtained to continue it, great loss frequently resulted and the delay was attended by many evils.

The National Rivers and Harbors Congress was called into existence to correct these conditions. Its slogan: "A Policy and Not a Project," is pregnant with meaning. The creation of a great national public sentiment by means of mutual enlightenment and wider appreciation by the different sections of the country of the needs and endeavors of all other sections, was to be its method by which old conditions were to be made no longer possible. The supply of money for the improvement and maintenance of our waterways was to be put on the same basis as other supplies for governmental needs, they were to be made annually, rather than triennially, the "pork barrel" methods were to be eliminated, and business methods substituted; the framing of a river and harbor bill was to become a matter of important commercial concern, a matter of civil and mechanical, rather than political engineering. And there has already been so much of realization in the aspirations and hopes of this great organization, that since 1910 we have had regular annual appropriations, something of uniformity, symmetry and impartial recognition of merit has been introduced, the work has been given a scope and a comprehensiveness never before known; the great importance of our waterways in the proper development of our commerce has been brought to the attention of the public with a thoroughness never before attempted; the influence of our waterways upon freight rates has been manifested to the people at large and a wholesome information has been disseminated which can only be productive of great and good results as the problem of internal transportation becomes more difficult and more complex. Regularity and uniformity have come to be considered essential in the making of these appropriations, partizanship is giving way to principle and all of this has greatly encouraged the army engineers in planning and executing the work. If The National Rivers and Harbors Congress, during the few years of its life has brought this about, surely no apology for its existence is necessary. On the middle Atlantic seaboard, the importance of this work has full appreciation.

At this port (Norfolk and Portsmouth, Va.), is located the largest naval station in America, and it is recognized as a place of the greatest stragetic importance from a naval standpoint. Naval experts, after care-

*Director National Rivers and Harbors Congress. Portsmouth, Va.

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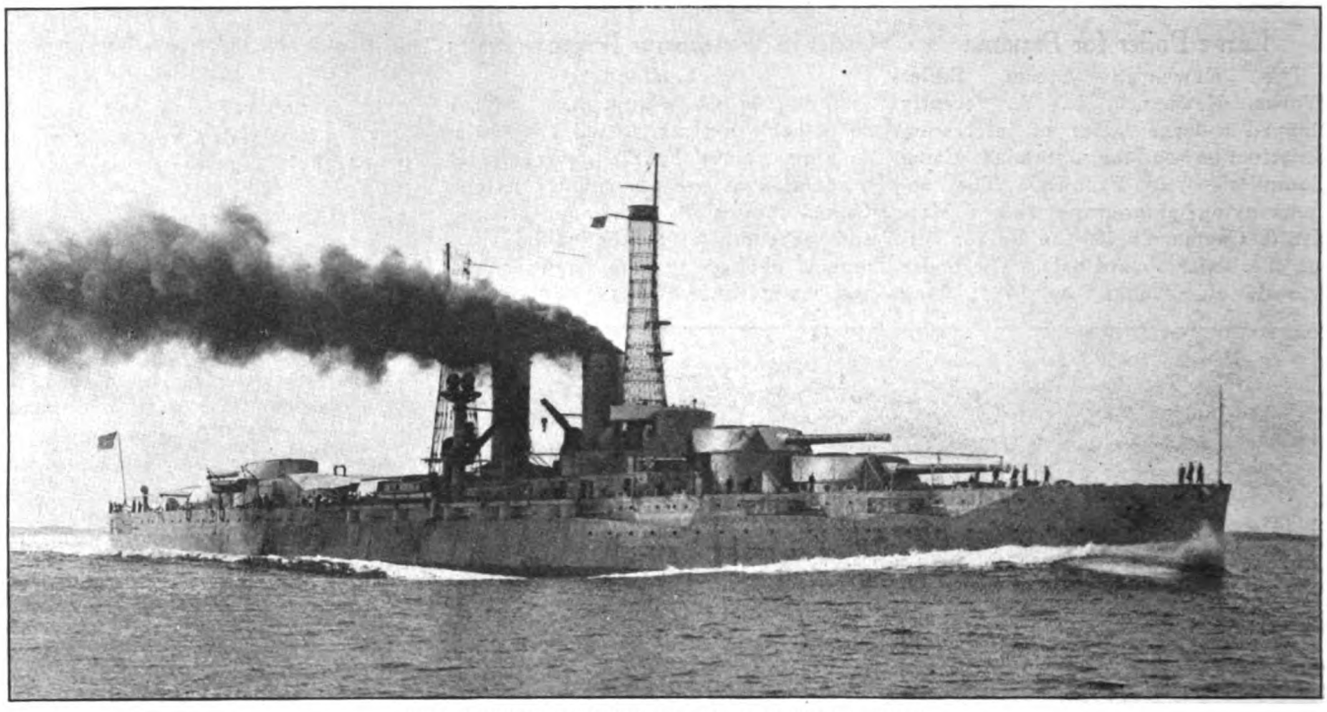

THE BATTLESHIP TEXAS ON HER TRIAL TRIP
Built by the Newport News Ship Building & Dry Dock Co., Newport News, Va.

ful consideration, have just recommended a further expenditure of $15,000,000, in the development of the naval station. Here is the greatest distributing point for steam coal in America—7,687,825 tons having been distributed from this port in 1912, and 1913 will show a material increase. The Albemarle and Chesapeake canal, connecting this port with the North Carolina sounds, and forming a connecting link in the magnificent system of inland waterways along the Atlantic seaboard, has just been purchased by the United States government. The opening of the Panama canal will make this the great coaling port for all vessels to and from the European ports.

By the report of the Chief of Engineers of the United States Army for 1910, it appears that the waterborne commerce of the port of Norfolk and Portsmouth, for that year, was 12,447,501 tons. This was nearly 25 per cent greater than the combined water-borne tonnage of Wilmington, N. C., Charleston, S. C., Savannah, Ga., Mobile, Ala., and New Orleans, La., and this tonnage, if carried at one time, would have overloaded by about 1,000,000 tons the entire merchant shipping of Great Britain, and would have loaded all the merchant ships flying the flags of France, Germany, Italy, Norway and Sweden, Denmark, The Netherlands and Belgium. When all this is considered, it is not surprising that the people of this maritime section are alive to the importance of having the activities of the United States government, in relation to the waterways of the country, put upon a broad business basis and freed from influence of partizan politics and they recognize the work of The National Rivers and Harbors Congress as the greatest factor in producing this much desired consummation.

Battleship Texas

The battleship Texas, recently completed by the Newport News Ship Building & Dry Dock Co., underwent her standardization trials Oct 27, attaining a mean speed of 22.28 knots on one run over the mile course off Rockland, Me. The average of the five fastest runs was 21.128 and the maximum horsepower developed was 28.100.

Contract for section 2 of the Welland ship canal has been awarded to Baldry, Yerburgh & Hutchinson, St. Catherines, Ont. The work involved amounts to $5,500,000, and the section embraces about 4½ miles, extending from bridge 2 to bridge 5. The contract for section 3 was awarded to O'Brien & Doheney and Quinlan & Robertson, Montreal.

Among the recent contracts closed for Terry turbines for government work, one covers two 50-k. w. sets for the United States fuel ship Kanawha, building at the Mare Island navy yard, San Francisco. Another includes two 300-h. p. turbines for fire pumps for the Brooklyn navy yard, each running at 2,600 revolutions per minute.

What is probably the oldest vessel in the world to be fitted with an internal combustion engine is the Ceres, built at Salcombe in 1811, and for many years in the fruit trade in the western islands. The Ceres was purchased in 1855 by Messrs. Pethrick, of Bude, who have just installed in her a two-cylinder 24 h. p. marine heavy oil engine.

The steel tug E. L. Ray, building by the John W. Sullivan Co. for the Southern Pacific Co., was launched from the yard of the New Jersey Dry Dock Co. at Elizabethport, N. J., Nov. 3. This tug is 96 ft. long, 23 ft. beam and 11½ ft. deep.

The Chesapeake Concrete Barge Co., Fairfield, Md., launched a concrete scow on Nov. 3. This craft has a box girder frame, a carrying capacity of over 500 tons and is 112 ft. long, 30 ft. beam and 10 ft. deep.

The Portland Ship Building Co., Portland, Me., is building a passenger steamer 110 ft. long, 24 ft. beam and 10 ft. deep for the Cape Breton Electric Co., Sydney, B. C.

I OFFER FOR IMMEDIATE ACCEPTance two Morris centrifugal pumps, size each, 14-in. suction, 12-in. discharge, direct connected to Armington and Sims center crank engine 15 x 15-in.; excellent condition; (capacity 40,500 gals. per hour) $680, net, f. o. b. Cleveland. W. H. Bosworth, 505 Commercial Bank building, with Capt. C. E. Benham, Cleveland, O. Main 25.

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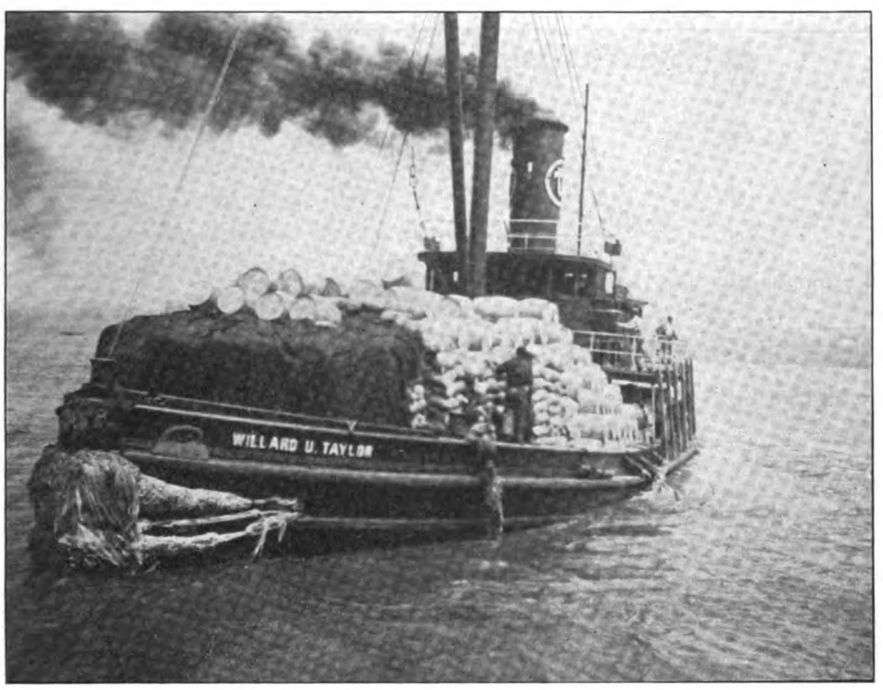
New Steel Lighter

The accompanying photograph shows the steel lighter Willard U. Taylor, owned by the Undercliff Terminal & Warehouse Co., of New York, with a load of 560,719 lbs. of sugar, representing 280 tons weight, or the capacity of 15½ cars.

This vessel was designed by Cox & Stevens, of New York City, and built at the works of John H. Dialogue & Son., Camden, N. J. The



STEEL LIGHTER WILLARD U. TAYLOR

dimensions of this lighter are: Length over all, 110 ft.; beam, 30 ft.; depth, molded, 12 ft.

She is equipped with heavy wooden spar and boom, hoisting engine and outfit, and her motive power consists of an inverted single cylinder, direct-acting, high pressure engine, 20 in. diameter, 26 in. stroke. The boiler is of the leg type, of ample size and is designed for a working pressure of 150 lbs. The vessel is heated by steam, lighted by electricity and has every modern appliance known and required for this type of craft.

Her hull is constructed of steel throughout, and is designed with a view to securing the strongest and most lasting structure that could be produced on the given dimensions. All the material entering into the hull was carefully tested at the works, and the builders used all possible care in construction.

On the main deck, the deck house, which is constructed of steel, is divided into fire room and engine room compartment and lamp locker. The upper deck house is constructed of wood and contains galley, mess room, three staterooms and toilet and at the forward end the pilot house.

The main deck house roof is extended out to the side of the vessel for a considerable distance, in order to afford protection to cargo. As usual, the machinery has been kept aft as far as possible, in order to leave the maximum available deck house forward for carrying cargo. This lighter will easily carry a load of between 300 and 350 tons.

In the design of this vessel, Cox & Stevens were directed to produce a vessel that would embody all the best possible features of a craft of her type and from her record in service, she appears to be all that the owners had expected.

Atlantic Transport Liner Maryland

On Saturday, Nov. 1, the screw cargo steamer Maryland, built by Harland & Wolff, Ltd., for the Atlantic Transport Line for their service between London and Baltimore, left Belfast and, after satisfactory trials, proceeded to London, Capt. S. W. Watkins being in command of the vessel.

The new vessel is 383 ft. 6 in. in length overall, and 50 ft. 4 in. extreme beam, with a gross tonnage of about 5,000. She has been built to the Board of Trade Survey, and the double bottom is constructed on the cellular principle with watertight bulkheads extending to the upper deck. There are five steel decks.

The Maryland is specially designed for the service; she will carry a large cargo and is provided with the latest and most approved facilities, having sixteen derricks, each lifting 5 tons; eleven double purchase winches, and steam windlass. The steering gear is of the Harland & Wolff's type, situated in a steel house aft on the upper deck and controlled by telemotor from the navigating bridge.

The vessel has good accommodation for the captain, officers, engineers and crew; complete installation of electric light, also wireless telegraphy and submarine signalling apparatus.

During construction the vessel has been under the supervision of Capt. Tubb, marine superintendent, and B. P. Fielden, superintendent engineer of the Atlantic Transport Line.

Cascade Boiler Circulators

The McNab Co., Bridgeport, Conn., patentees and manufacturers of the McNab direction indicators and other McNab engineering appliances, advise that they have shipped from their works this week seventy sets of their Cascade multiflow boiler circulators for the following steamers, which are employed on the great lakes and Atlantic coast: Clifford Moll, Leonard B. Miller, D. R. Hanna, Peter Reiss, Moses Taylor, E. W. Oglebay, B. F. Berry, W. S. Mack, car ferry Ashtabula, Milwaukee, S. O. Tug No. 15, S. O. Tug Astral.

Further contracts for the supply of these circulators are also in hand. The McNab Cascade boiler circulator was recently invented by Alec. McNab, vice president of The McNab Co., Bridgeport, Conn.

The lake steamers Charlemagne Tower Jr., Wallula and Lansing, recently sold to Atlantic coast interests, are at the works of Blaisdell, Leeman & Co., Bath, Me., undergoing alterations to hull and machinery to fit them for service as lumber carriers on the coast.

The steel tug Newark, built by the Skinner Shipbuilding & Dry Dock Co., Baltimore, Md., for the Lackawanna railroad, recently underwent her trial trip. The tug is intended for service in New York harbor, and is 105 ft. long, 25 ft. 6 in. beam and 12 ft. 6 in. deep.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., launched the freight steamer Manoa for the Matson Navigation Co. Nov. 1. The new steamer is a sister to the Matsonia, described in the October MARINE REVIEW.

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Volturno's Last Phase

Capt. Schmidt, of the Dutch oil steamer Charlois, fell in with the derelict Volturno on Oct. 17, and not knowing anything of the tragedy that had been enacted on her, boarded her and gave the world the last account of the spectacle as follows:

"Flocks of sea birds were hovering shrieking over the blackened hull. The decks were bent and twisted in all directions with the heat while down in the hold the cargo was still smoldering. Flames still came from the forecastle and stern. Apparently the only part of the ship not damaged by the flames was the engine room."

Captain Schmidt, realizing that the hull was a serious menace to navigation, opened the outer circulation tubes and sea cocks, causing the Volturno to sink.

Test of Roebling Wire

Tests were recently made of the Roebling wire ropes to be used as towing lines at the great locks at Gatun and Miraflores. Forty wire ropes each 400 ft. long have so far been made for this purpose. Each has six strands, with 37 wires in each strand, the strands being twisted around a hemp center. The ropes are 1 in. diameter and have a 4-ft. loop at one end. The specifications called for a tensile strength of 37 tons each. To obtain this requires a tensile strength in the wire of 260,000 lb. per sq. in. Pieces cut from the ends of the ropes, when broken in the testing machine, showed the ropes to have strengths ranging from 12 to 15 per cent in excess of that called for by the specifications. In towing boats through the locks four electric locomotives will be used for each vessel at each lock. Two of these locomotives will be connected by wire ropes to the bow and two to the stern.

Dry Dock at South Boston

The dry dock which the directors of the port of Boston contemplate building in South Boston will be of the following dimensions:

Length over all, 1,200 ft.; docking length of floor, about 1,162 ft.; entrance width at top, 133 ft.; entrance width at bottom, 120 ft.; depth over sill at m. l. w., 35 ft.; depth over sill at m. h. w., 44.8 ft.

The work on bulkheads and solid filling around the side of the dry dock is already in progress. Bids for the dry dock will be requested as soon as the preliminary work has sufficiently advanced.

The steadily increasing demand for the I. O. C. system oxygen and hydrogen generating plants has made necessary the removal of the executive offices of the International Oxygen Co. from 115 Broadway, New York, to their works at Newark, N. J. Additional buildings have been erected to house the executive offices and provide additional manufacturing room for the increased demands made upon the plant. The improved facilities will permit the company to handle a much larger volume of business than at present, with the utmost efficiency and dispatch. The general sales offices will remain at 115 Broadway, New York.

The Newport News Ship Building & Dry Dock Co., Newport News, Va., laid the first keel plate of the new battleship Pennsylvania on Oct. 27.

MONTHLY SHIPBUILDING RETURNS.

The bureau of navigation reports 98 sailing, steam, and unrigged vessels of 38,059 gross tons built in the United States October, 1913, as follows:

	Wood—Sail.		Wood—Steam.		Wood—Unrigged.		Steel—Steam.		Total.	
	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.	No.	Gross.
Atlantic and Gulf	5	697	27	1,124	21	5,601	10	27,616	63	35,038
Porto Rico	..	...	..	.....	..	.....	..	.....	..	.....
Pacific	..	...	10	1,178	2	664	1	64	13	1,906
Hawaii	..	...	..	.....	..	.....	..	.....	..	.....
Great lakes	..	...	11	492	2	212	3	238	16	942
Western rivers	..	...	6	173	..	.....	..	.....	6	173
Total	5	697	54	2,967	25	6,477	14	27,918	98	38,059

The largest vessels in this list are the Matsonia, 9,728 tons; Santa Cecelia, 6,309 tons; Manhattan, 3,539 tons; Lewis K. Thurlow, 3,178 tons; City of Annapolis and City of Richmond, 1,923 tons each.

SUMMARY OF NAVAL CONSTRUCTION.

Name of vessel.	Contractor.	Per cent of completion. Nov. 1, 1913. Total.	Nov. 1, 1913. Per cent. on ship.	Oct. 1, 1913. Total.	Oct. 1, 1913. Per cent. on ship.
BATTLESHIPS					
New York	New York Navy Yard	92.0	91.1	89.9	89.0
Texas	Newport News S. B. Co.	96.0	95.4	95.2	94.4
Nevada	Fore River S. B. Co.	49.2	30.4	45.5	26.7
Oklahoma	New York S. B. Co.	48.7	42.7	45.3	36.1
Pennsylvania	Newport News S. B. Co.	11.8	5.6	9.1	2.8
	New York Navy Yard	....	....	....	....
DESTROYERS.					
Downes	New York S. B. Co.	81.7	81.0	74.7	73.7
Aylwin	Wm. Cramp & Sons	97.4	97.4	97.0	97.0
Parker	Wm. Cramp & Sons	95.2	95.0	95.0	94.8
Benham	Wm. Cramp & Sons	93.0	92.8	92.9	92.7
Balch	Wm. Cramp & Sons	92.6	92.4	92.2	92.0
O'Brien	Wm. Cramp & Sons	14.9	7.5	11.7	4.3
Nicholson	Wm. Cramp & Sons	13.6	6.0	11.8	4.3
Winslow	Wm. Cramp & Sons	14.2	7.0	11.8	4.3
McDougal	Bath Iron Works	34.3	27.9	23.2	15.5
Cushing	Fore River S. B. Co.	21.3	14.8	19.5	12.9
Ericsson	New York S. B. Co.	15.1	7.1	11.8	3.9
DESTROYER TENDERS.					
Melville	New York S. B. Co.	10.0	....	....	....
SUBMARINES					
G-4	American Laurenti Co. (Phila.)	96.4	95.5	96.3	95.4
G-2	Lake Tow Boat Co. (Bridgeport)	89.7	89.7	88.3	88.3
H-1	Electric Boat Co. (San Francisco)	97.9	97.9	97.7	97.7
H-2	Electric Boat Co. (San Francisco)	97.9	97.9	97.7	97.7
H-3	Electric Boat Co. (Seattle)	98.0	97.9	92.9	92.8
G-3	Lake Tow Boat Co. (Bridgeport)	74.2	73.9	72.0	71.6
K-1	Electric Boat Co. (Quincy)	94.0	94.0	92.6	92.6
K-2	Electric Boat Co. (Quincy)	91.8	91.8	90.1	89.6
K-3	Electric Boat Co. (San Francisco)	88.6	87.8	85.9	84.9
K-4	Electric Boat Co. (Seattle)	88.0	86.0	85.3	83.2
K-5	Electric Boat Co. (Quincy)	79.3	76.9	76.4	73.5
K-6	Electric Boat Co. (Quincy)	78.3	75.8	75.5	72.6
K-7	Electric Boat Co. (San Francisco)	78.5	76.6	77.0	75.0
K-8	Electric Boat Co. (San Francisco)	76.4	74.5	75.1	73.1
L-1	Electric Boat Co. (Quincy)	13.0	9.2	9.1	6.2
L-2	Electric Boat Co. (Quincy)	13.0	9.2	9.1	6.2
L-3	Electric Boat Co. (Quincy)	13.0	9.2	9.1	6.2
L-4	Electric Boat Co. (Quincy)	13.0	9.2	9.1	6.2
L-5	Lake Tow Boat Co. (Bridgeport)	7.4	4.2	7.3	...
L-6	Lake Tow Boat Co. (Long Beach, Cal.)	....	....	....	....
L-7	Lake Tow Boat Co. (Long Beach, Cal.)	....	....	....	....
M-1	Electric Boat Co. (Quincy)	9.7	6.4	7.7	4.8
SUBMARINE TENDERS					
Fulton	New London S. & E. B. Co. (Quincy)	23.4	13.7	18.6	10.7
Bushnell	Seattle Construction & D. D. Co.	3.0	....	1.0	....
FUEL SHIPS					
Kanawha	Mare Island Navy Yard	9.4	2.6	3.1	1.9
Maumee	Mare Island Navy Yard	5.3	...	0.1	...
GUN BOATS					
Sacramento	Wm. Cramp & Sons	54.4	51.1	47.9	44.8
Monocacy	Mare Island Navy Yard	99.0	99.0	83.9	82.7
Palos	Mare Island Navy Yard	100.0	100.0	83.9	82.7

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JAN 16 1913

Annual Shipbuilding Number

THE MARINE REVIEW

VOL. 43 CLEVELAND JANUARY, 1913 NEW YORK No. 1

"Equally Efficient on Salt and Fresh Water"

THE UNION SULPHUR COMPANY
GENERAL OFFICES 17 BATTERY PLACE
NEW YORK

J. R. GORDON
TRAFFIC MANAGER

December 13th, 1912.

Eckliff Automatic Boiler Circulator Co.,
Detroit, Mich.

Gentlemen:-

I have your favor of August 27th in reference to the Eckliff Circulators in the boilers of the S/S HERMAN FRASCH, and beg to state that we will be very glad to have you refer any of your prospective customers on the Atlantic Seaboard to us in regard to this device, and you may use our installation for advertising the circulators to any extent you may see fit.

As soon as the S/S FRIEDA, which is now nearing completion, has worked out her builders' guarantee, we propose to fit the circulators in the Scotch boilers of this steamer.

Yours very truly,

J. R. Gordon.

JRG/S

Read "THE MARINE REVIEW EXCHANGE"--You'll Find It Interesting

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FOR LAND AND MARINE BOILERS

Uniform Thickness **Easily Cleaned** **Unexcelled for Strength**

Also FOX CORRUGATED FURNACES

Manufactured by

THE CONTINENTAL IRON WORKS

West and Calyer Sts., BOROUGH OF BROOKLYN, NEW YORK

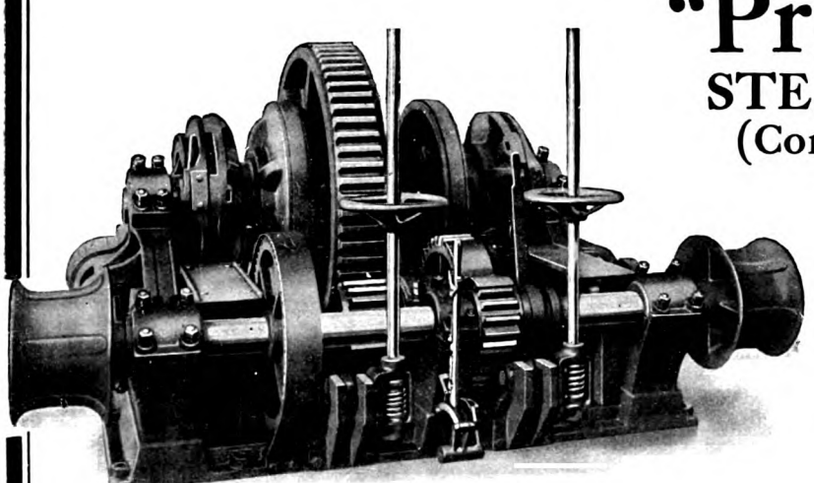
Near 10th and 23rd St. Ferries

"Having a PULL means having a friend in power who will act as a steam windlass for you." The

"Providence"

STEAM WINDLASS

(Compound Spur Gears)



has another kind of *pull*, and plenty of it. It has 15 per cent more *pull* than the worm geared types and at 50 per cent faster speed. You have been looking for just this combination. Our price will please you, too.

Write us today.

AMERICAN ENGINEERING COMPANY

SUCCESSORS TO AMERICAN SHIP WINDLASS CO. AND WILLIAMSON BROS. CO.

MACHINISTS AND FOUNDERS

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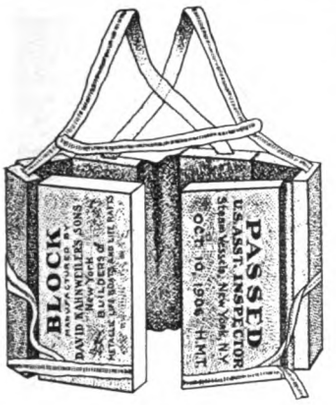


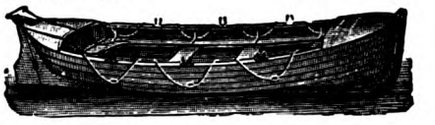
Solid Block Cork Life Preservers

Warranted 24 pounds. Buoyancy and full weight of Cork and Workmanship as required by U. S. Inspectors.

SAFEST CHEAPEST

SOLID CORK LIFE PRESERVERS
RING BUOYS AND FENDERS

Approved and adopted by U. S. Board of Supervising Inspectors. Also adopted by the principal Ocean, Lake and River Steamer Lines as the only Reliable Life Preserver. Awarded four Medals by World's Columbian Exposition.



METALLIC AND WOODEN LIFE BOATS
METALLIC LIFE RAFTS
MARINE DRAGS LYLE GUNS
WICKS' PATENT RELEASING BLOCKS FOR LIFE BOATS

DAVID KAHNWEILER'S SONS

260 FRONT ST., COR. DOVER ST NEW YORK CITY

Keep your Motor Boat Dry with this Bilge Pump

When you use a bailer to remove bilge water, there is always sure to be some water left, even if you take out the floor grating.

This little pump (28 inches high), will take out every bit of water and the flooring need not be moved.

Deming Motor Boat Pumps

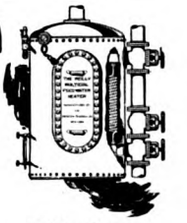
are made entirely of brass, and are not affected by salt water. They will last for years. No motor boat owner can afford to be without one. Price of "Success" pump in illustration $3.85 net. Shipping weight 10 pounds.

THE DEMING COMPANY

SALEM, OHIO

Henion & Hubbell, Chicago, General Western Agents

Marine Money Savers



Reilly Heater

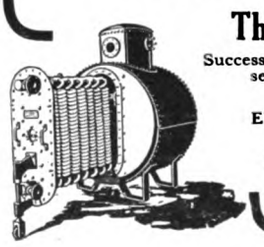
That's what the **Reilly Multicoil Feed Water Heaters** are, and a list of vessels equipped with these heaters will be mailed you to prove this statement.

Reilly *Multicoil* Evaporators
(Navy Type)

are also money savers and are especially designed for marine use, their construction permits removing coils and manifolds with one operation, priming is eliminated and cost of upkeep reduced to the minimum by this construction.

These two G-R Specialties have many millions of horse-power to their credit afloat and on land, owing to their high efficiency, economy and reliability.

Write for Bulletins Nos. 206 and 302



The Griscom-Russell Co.

Successor to The Griscom-Spencer Co., The Russell Engine Co. and The James Reilly Repair & Supply Co.

ENGINEERS - MANUFACTURERS
Land and Marine

2121 West Street Building
NEW YORK

THE ARMSTRONG MANUFACTURING CO.

New York **296 Knowlton St., Bridgeport, Conn.** **Chicago**

MANUFACTURERS OF

THE GENUINE ARMSTRONG STOCKS AND DIES

Which have stood the most critical and severe tests.

Also manufacturers of

PIPE MACHINES, BOTH HAND AND POWER
PIPE CUTTERS, ADJUSTABLE BUSHINGS, RATCHET ATTACHMENTS

Catalog mailed on request.

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The Battleship "TEXAS", now under construction for the United States Navy, will be equipped with

This Company is also furnishing Windlasses, Steering Gears and other Auxiliaries for the Battleships "MORENO" and "RIVADAVIA" now under construction in this country for the Argentine Republic.

Steam Windlass

Steam Steering Engine and Screw Gear

Steam Coaling Winches

Electric Capstan

Electric Winch and Ash Hoist Engines

Manufactured by

HYDE WINDLASS COMPANY

BATH, MAINE

Engineers Recommend

DIXON'S FLAKE GRAPHITE

¶ Your fellow marine engineers know and recommend the use of Dixon's Flake Graphite.

¶ Our booklet, "Graphite on Shipboard", tells how. Write for free copy 77-C.

Joseph Dixon Crucible Co.

JERSEY CITY, N. J.

PENBERTHY

AUTOMATIC INJECTOR

No other INJECTOR on the market so simple, reliable or durable.

600,000 Engineers testify as to its merits. WORLD'S STANDARD.

The Penberthy Automatic is absolutely so, it is re-starting, self-draining. It is the ideal Injector for Marine use.

"XL--96" EJECTOR

On account of the great elevating and lifting power of the "XL-96" when using a minimum amount of steam, it is at its best when replacing the bilge pump.

Our new 1913 catalog tells of these. Write for it—Now.

Penberthy Injector Co.

368 HOLDEN, DETROIT, MICH.

IF You Want To SELL Your BOAT or Any MARINE EQUIPMENT-- We'll Find a Buyer--Quick, Through "THE MARINE EXCHANGE"

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THE MARINE REVIEW

VOL. 43 CLEVELAND FEBRUARY, 1913 NEW YORK No. 2

WONDERFULLY SIMPLE SIMPLY WONDERFUL

Eckliff Automatic Boiler Circulators

FOR SCOTCH AND MARINE FIRE BOX BOILERS

"Watch the Thermometer"

Positive Circulation

Equality of Temperatures Guaranteed

Increased Thermal Efficiency

Saving in Fuel

Eckliff Circulators installed in four furnace boilers at Newcastle, England.

Eckliff Circulators are protected by basic patents in the United States, Canada, Foreign Countries.

No Holes Cut to Install. Installation can be made within five to six hours.

You Cannot Fail to Realize its Value

Eckliff Automatic Boiler Circulator Co.

DETROIT, MICHIGAN, U. S. A.

WANT to Buy or Sell a Boat or Other Marine Equipment? If so—"The Marine Exchange" Will Find "The" Man

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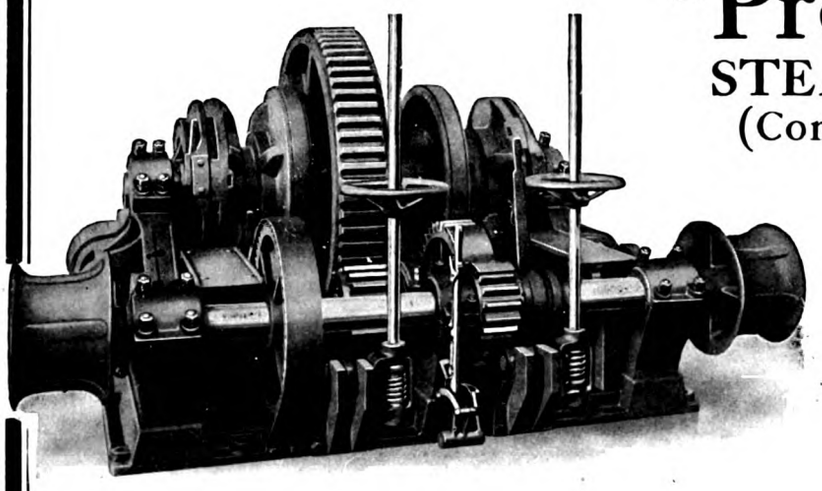
"Providence"
STEAM WINDLASS
(Compound Spur Gears)



has another kind of *pull*, and plenty of it. It has 15 per cent more *pull* than the worm geared types and at 50 per cent faster speed. You have been looking for just this combination. Our price will please you, too.

Write us today.

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SUCCESSORS TO AMERICAN SHIP WINDLASS CO. AND WILLIAMSON BROS. CO.
MACHINISTS AND FOUNDERS
PHILADELPHIA

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Morison Suspension Boiler Furnaces

FOR LAND AND MARINE BOILERS

Uniform Thickness **Easily Cleaned** **Unexcelled for Strength**

Also FOX CORRUGATED FURNACES

Manufactured by

THE CONTINENTAL IRON WORKS
West and Calyer Sts., BOROUGH OF BROOKLYN, NEW YORK
Near 10th and 23rd St. Ferries

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THE MARINE REVIEW

VOL. 43 CLEVELAND MARCH, 1913 NEW YORK No. 3

STRATFORD
OAKUM
THERE ARE MANY REASONS WHY
Every Ship Needs
Stratford Oakum
There are many reasons why Stratford Oakum is the most efficient and reliable.
If YOU are interested in Navigation, listen to what we have to say:
Stratford Oakum is the easiest and most economical to spin, contains the least waste, and is the most impervious to water.
There is absolutely no waste to Stratford Spun Oakum.
Our machinery equipment and methods are ten years ahead of our competitors. Our Marine Oakum has been the standard for over 50 years, every bale contains printed guarantee. Perfect Spun Oakum of any twist, any length to the pound.
Our grade "New Best Oakum" is made entirely of New Russian Hemp We originated Plumbers' Oakum and have led in quality ever since. We make fine quality jute packing, tarred, untarred or paraffined. Our binders' trunk, friction and other boards, is of the very finest quality.
Write at once for full information
The Best Since 1860
GEO. STRATFORD OAKUM CO.
JERSEY CITY N.J.

THE "Marine Exchange" is a window always dressed with the bargains of the Marine Field. Have you looked in?

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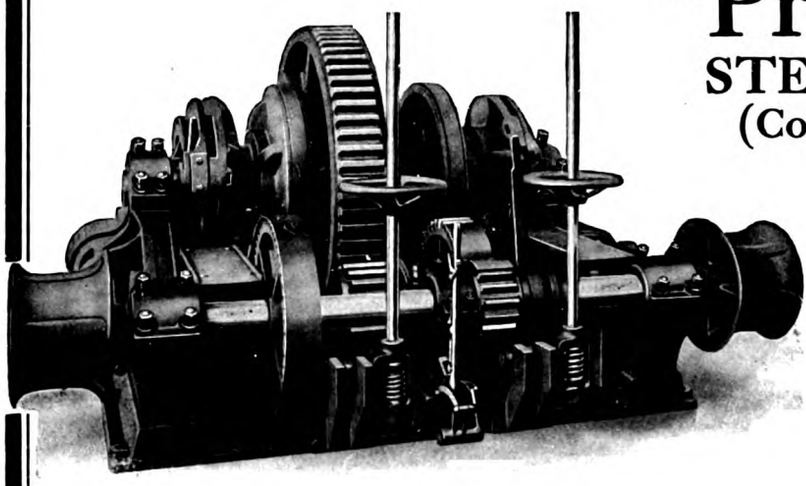

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THE MARINE REVIEW

VOL. 43 CLEVELAND APRIL, 1913 NEW YORK No. 4

Interested in

Metallic Packing?

Simplex

Inferior packing causes a great deal of useless trouble and expense. "Simplex" Metallic Packing is a guarantee against packing troubles.

Better get busy at once—write us.

Then give "Simplex" a trial.

"Simplex" Metallic Packing is designed by a specialist of long and extensive experience. It completely eliminates all the weak points and objectionable features of other packings, and can be made to meet any special requirements.

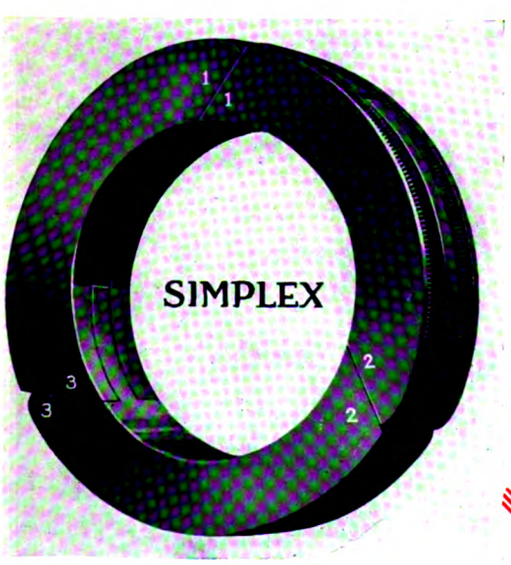
We furnish "Simplex" for any make of casing.

"Simplex" will not score the rod; it is reliable, easily installed, and minutely adjustable; displacement is impossible and no attention is required.

"Simplex" is durable and economical—it is installed without disconnecting the engine, and will remove trouble for years to come.

"Simplex" Rings have no Dowel Pins!

"Simplex" is the perfect system! Investigate it!



Every set of packing built by us is plainly numbered.

This number we keep on file together with data and complete measurements.

Any part may be easily ordered from us by sending the number.

Renewals thus ordered are guaranteed to correspond with former measurements.

We guarantee you service and results!

Let us hear from you today.

High Class Representation desired.

Simplex Manufacturing Co.

OBERLIN U. S. A. OHIO

EVERY wide-awake marine man watches the "Marine Exchange" closely for bargains. Returns prove it. Pages 96, 97, 98

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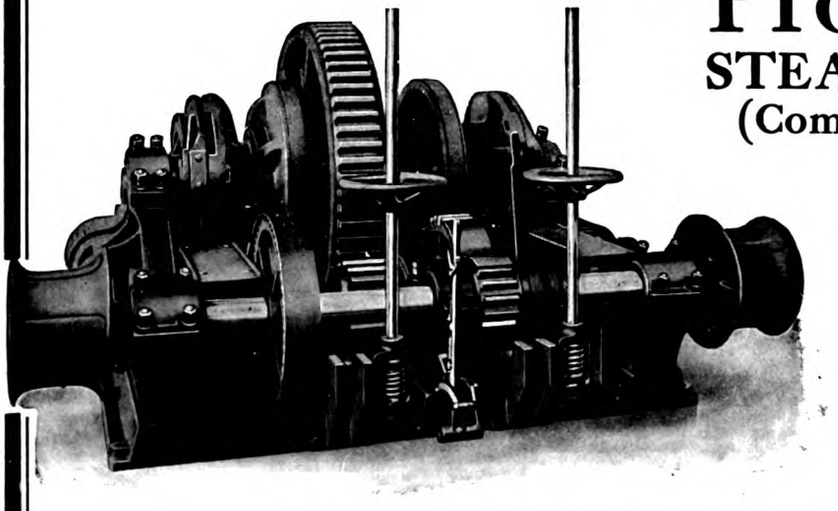

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THE MARINE REVIEW

VOL. 43 CLEVELAND MAY, 1913 NEW YORK No. 5

The Great Lakes RED BOOK

¶ Containing a list of over one thousand vessels on the Great Lakes, together with the names of the Owners, Captains and Engineers.

¶ This book is now on the press, and delivery can be promised within a few days.

¶ An invaluable guide to anyone desiring to reach the great marine trade of the lakes.

ARE YOU GETTING YOUR SHARE?

PRICE $1.00

The Penton Publishing Co. Cleveland, O.

THE "Marine Exchange" produces results. "Over twenty inquiries, have sold boat," states one advertiser. *See pages 95, 96 and 97*

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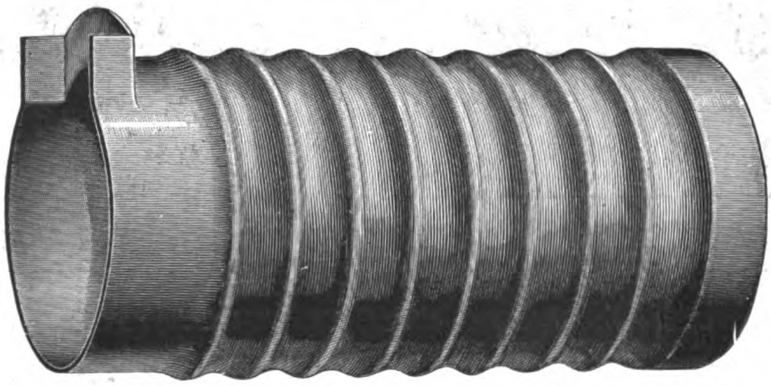

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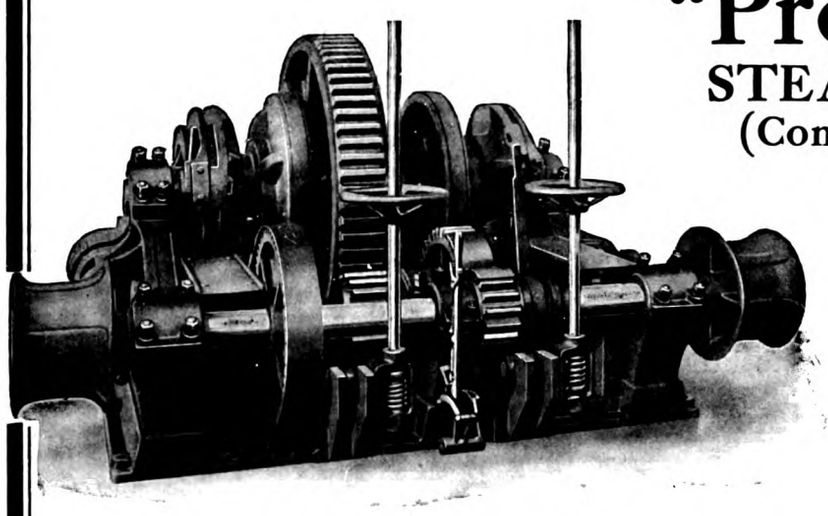

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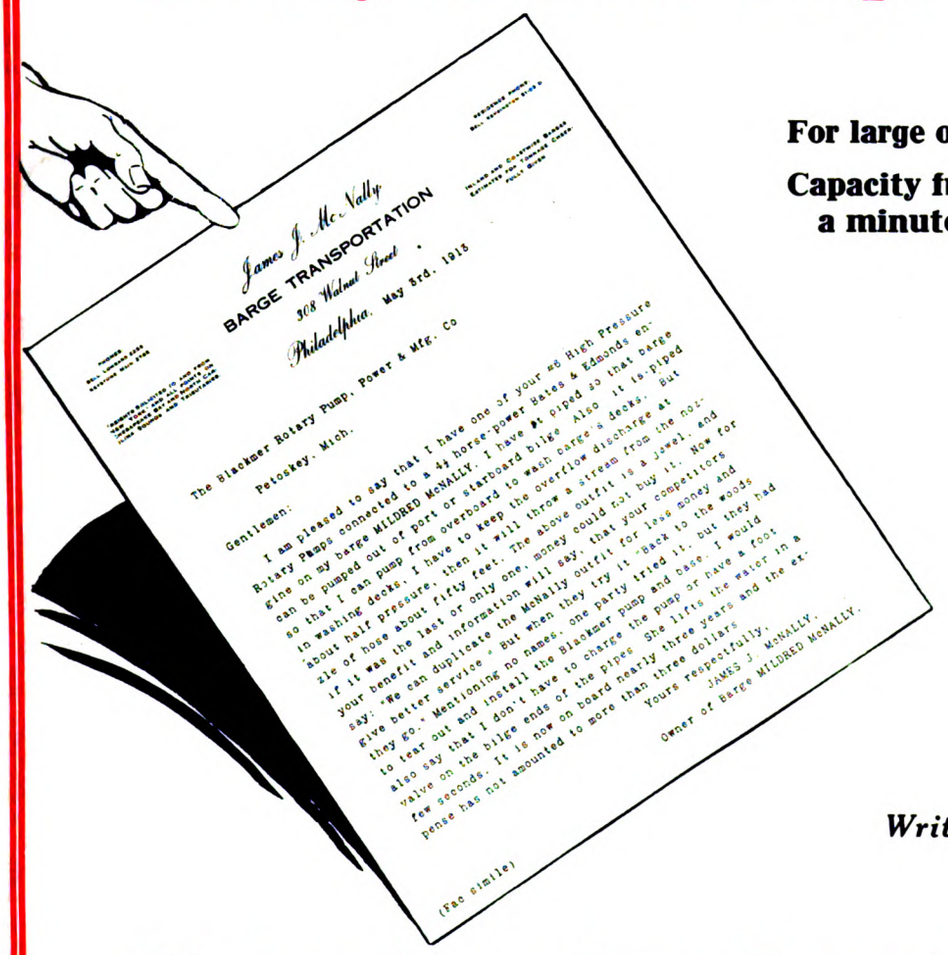
THE MARINE REVIEW

VOL. 43 CLEVELAND JUNE, 1913 NEW YORK No. 6

Blackmer Patented Rotary Marine Bilge Pump


James J. McNally
BARGE TRANSPORTATION
308 Walnut Street
Philadelphia, May 3rd, 1913

The Blackmer Rotary Pump, Power & Mfg. Co
Petoskey, Mich.

Gentlemen:

I am pleased to say that I have one of your #6 High Pressure Rotary Pumps connected to a 4½ horse-power Bates & Edmonds engine on my barge MILDRED McNALLY. I have it piped so that barge can be pumped out of port or starboard bilge. Also it is piped so that I can pump from overboard to wash barge's decks. But in washing decks, I have to keep the overflow discharge at about half pressure, then it will throw a stream from the nozzle of hose about fifty feet. The above outfit is a jewel, and if it was the last or only one, money could not buy it. Now for your benefit and information will say, that your competitors say: "We can duplicate the McNally outfit for less money and give better service." But when they try it "Back to the woods they go." Mentioning no names, one party tried it, but they had to tear out and install the Blackmer pump and case. I would also say that I don't have to charge the pump or have a foot valve on the bilge ends of the pipes. She lifts the water in a few seconds. It is now on board nearly three years and the expense has not amounted to more than three dollars.

Yours respectfully,
JAMES J. McNALLY,
Owner of Barge MILDRED McNALLY.

(Fac simile)

For large or small boats.

Capacity from 5 to 500 gallons a minute.

The Pumping Outfit mentioned in the letter above occupies a space of 3 ft. by 5 ft.

It has more power than necessary for this capacity — which is 100 gallons a minute.

The volume can be doubled with the same power.

Let us send you complete information.

Write us today.

Blackmer Rotary Pump, Power & Mfg. Co.

PETOSKEY, MICH., U. S. A.

Export Office, 24 State St., New York

ONE man says: "Gentlemen:—We bought the boat and have her here now. The ad brought results." See pages 96, 97, 98 for bargains

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Manufactured by

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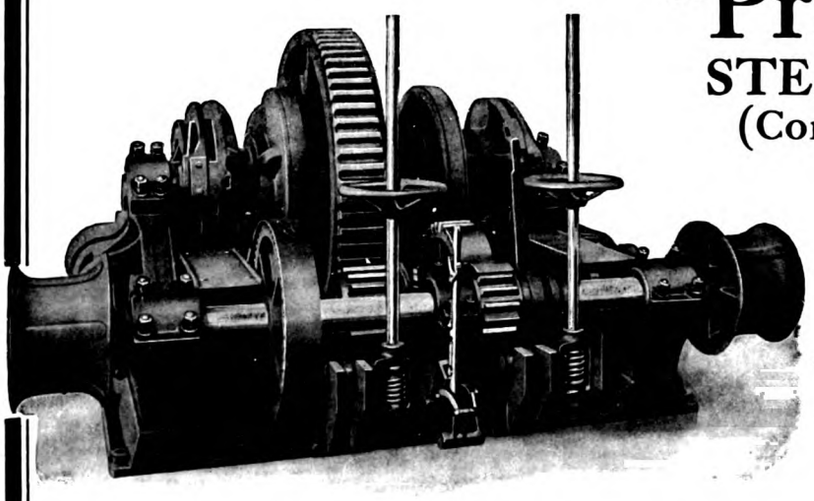
STEAM WINDLASS

(Compound Spur Gears)



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THE MARINE REVIEW

VOL. 43 CLEVELAND JULY, 1913 NEW YORK No. 7

BLUE BOOK
OF
AMERICAN SHIPPING

The Only Marine Directory Published in the United States

Containing a list of steam vessels on the Atlantic and Pacific Coasts, the Great Lakes and Western Rivers; lists of ship owners, ship, engine and boiler builders, manufacturers of gas and gasoline engines, naval architects, marine engineers, admiralty lawyers, ship chandlers, wrecking companies—in fact a complete marine directory.

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FOR LAND AND MARINE BOILERS

Uniform Thickness **Easily Cleaned** **Unexcelled for Strength**

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Manufactured by

THE CONTINENTAL IRON WORKS

West and Calyer Sts., BOROUGH OF BROOKLYN, NEW YORK

Near 10th and 23rd St. Ferries

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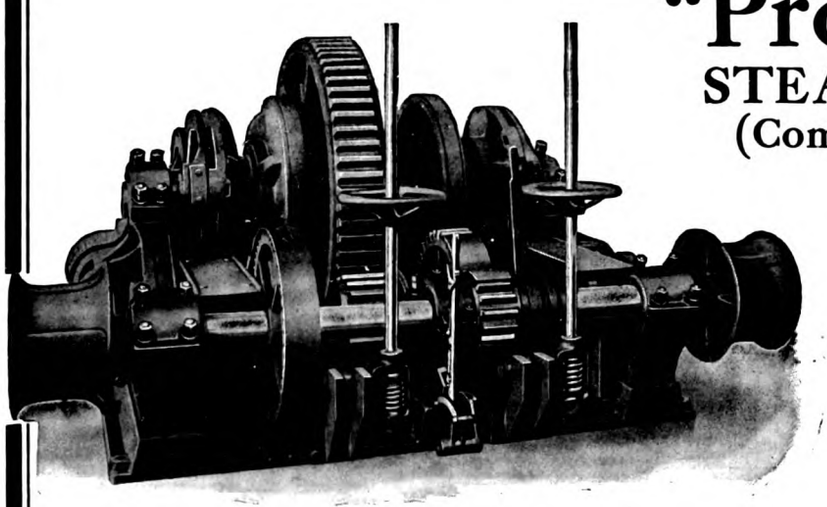
STEAM WINDLASS

(Compound Spur Gears)



has another kind of *pull*, and plenty of it. It has 15 per cent more *pull* than the worm geared types and at 50 per cent faster speed. You have been looking for just this combination. Our price will please you, too.

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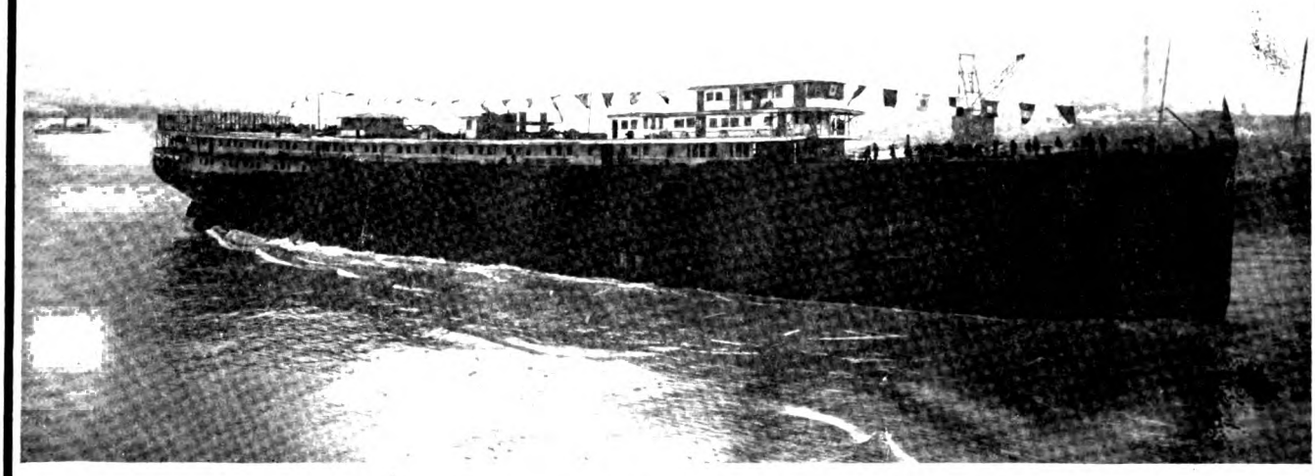
VOL. 43 CLEVELAND AUGUST, 1913 NEW YORK No. 8

PAST PERFORMANCES
TELL THE STORY



New Steamer Congress, of Pacific Coast Steamship Co. Fleet,
Built by New York Shipbuilding Co., Camden, N. J.

NEVASPLIT STANDS UPON ITS RECORD

which includes the Wainscoting, bulkheading, deck-paneling and door paneling of many fine ships.

The specifications and orders awarded us for several more and larger contracts prove that it offers

ADVANTAGES THAT GET THE DECISION

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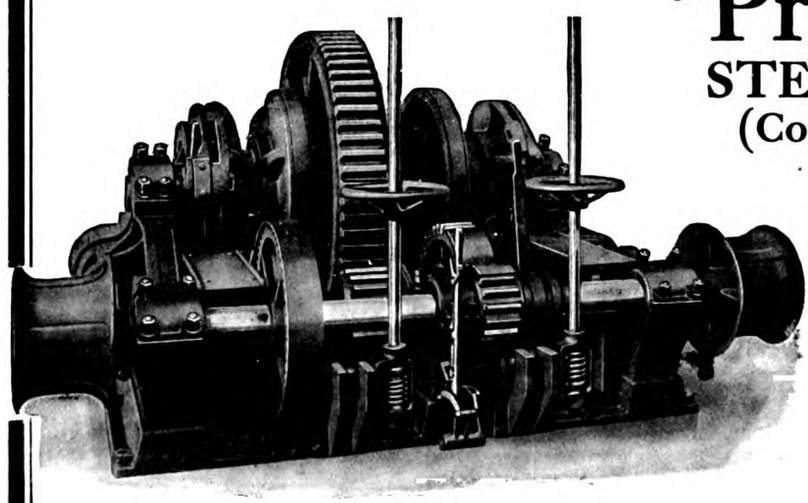

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Yes Sir, It's the Real Thing!

It Certainly Has Made Good

It is impervious to heat—
It is impervious to cold—
It will not crack—
It bonds perfectly with either wood, steel or masonry.

Where all others have absolutely failed

Byerlyte Bituminous Deck Floors

have fulfilled every requirement. For many years ship builders and owners have sought a **flooring** for **cabins, bathrooms, living quarters, freight decks, tank tops, warehouses,** etc., that would withstand all conditions and at the same time bond perfectly with either **wood, steel** or **masonry. AND HERE IT IS!**

It has been used on board vessels with most excellent results. Temperatures, strains, water—nothing has been able to deteriorate it. Being pliable and resilient it accommodates itself to vibrations and shocks. Being moisture proof and of mineral composition it is practically indestructible.
Shipbuilders claim that it is the **ONLY** product that meets their requirements.
It is the only floor that will meet all your requirements. Write us today!

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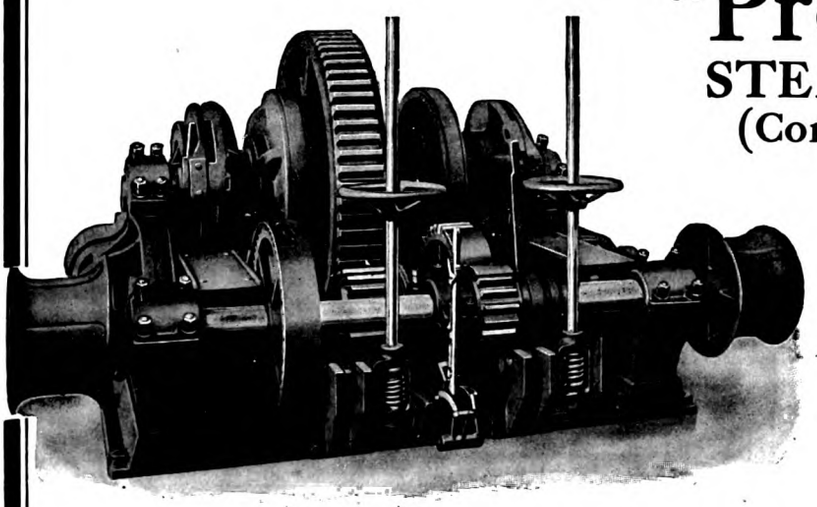

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LIME ISLAND FUEL DOCK

OUR NEW LIME ISLAND FUEL DOCK, Soo River, is now in operation. Fuel Pockets Capacity 800 Tons. Fastest Fuel Handling Plant on the Great Lakes. Steamers can reach dock without rounding to, load fuel and be on their way within five minutes. We handle nothing but our **Celebrated Pittsburgh Coal** on this dock.

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Port Royal Dock Co.

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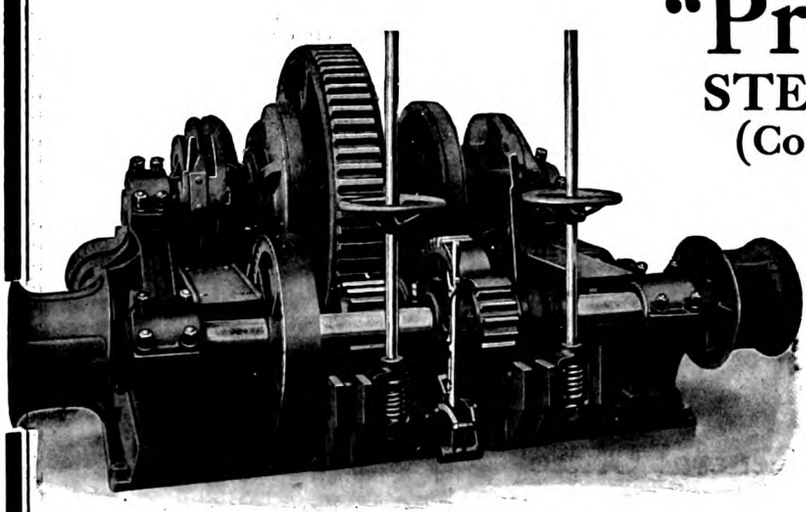

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VOL. 43 CLEVELAND NOVEMBER, 1913 NEW YORK No. 11

TWO BIG SPECIAL ISSUES
of
THE MARINE REVIEW

December—

The Annual Waterways Number

The National Rivers and Harbors Congress will convene at Washington, D. C., December 3, 4 and 5. The Waterways number will be devoted especially to problems of river and harbor improvement and to all of the tremendously important topics that will command the attention of the Rivers and Harbors Congress.

January—

The Annual Shipbuilding Number

Shipbuilding summaries will be given of ships under construction or under order and marine developments of 1913 will be reviewed at length.

The Panama Canal

Special attention will be paid to the new trade routes and new steamship lanes which this great waterway will create. The canal will open to navigation in the early spring, a feature of outstanding importance in the world of commerce.

Society of Naval Architects and Marine Engineers

The twenty-first annual meeting convenes in December. Its discussions which will be covered in full in this issue embrace everything of moment in current practice.

THE MARINE REVIEW :: Cleveland

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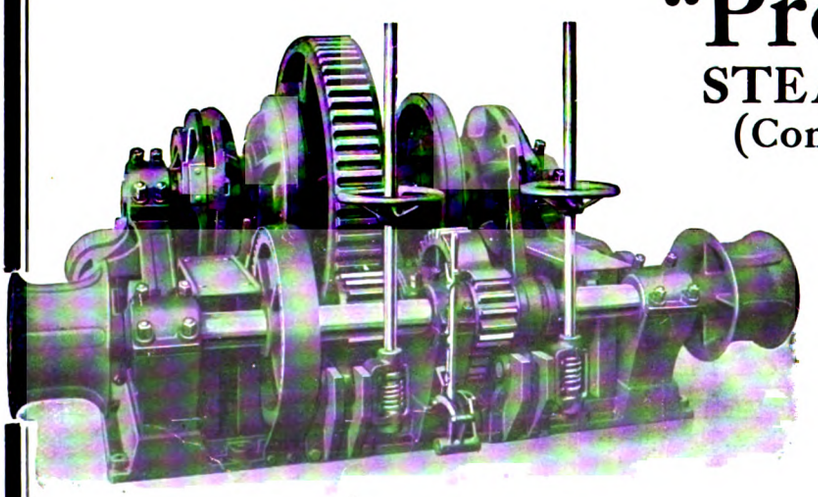

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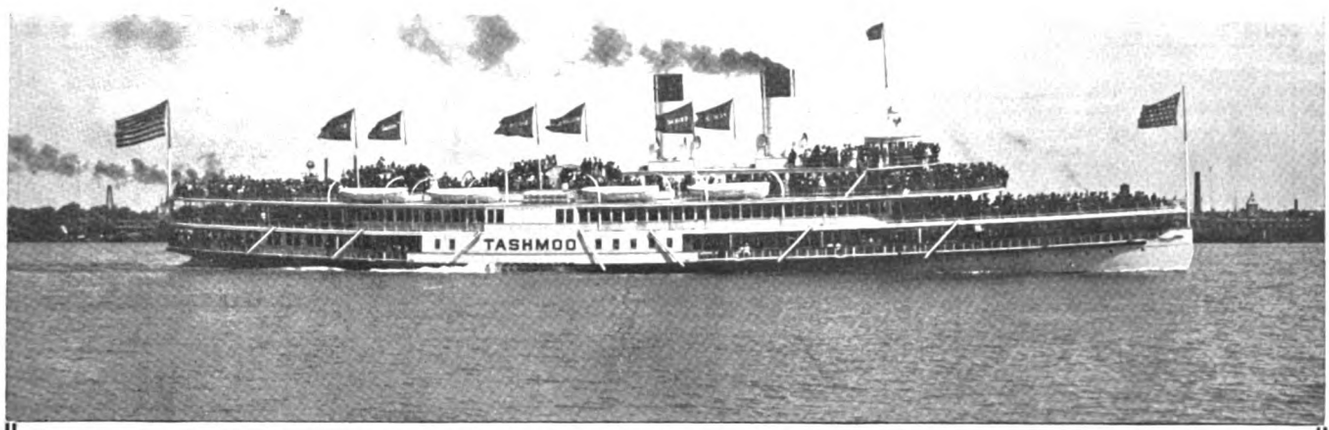
Byerlyte Deck Flooring

The Only Successful Composition Flooring for Ships



The Magnificent White Star River Steamer TASHMOO has been Equipped with Byerlyte Deck Flooring

¶Vessel Owners are recognizing the wonderful adaptability of Byerlyte Deck Flooring for ships. It absolutely will not crack; it binds perfectly with either wood or steel; it is waterpoof, fireproof and verminproof; it is entirely mineral, is indestructible and will wear forever.

Vibration Cannot Break Its Surface.

BYERLEY & SON CLEVELAND

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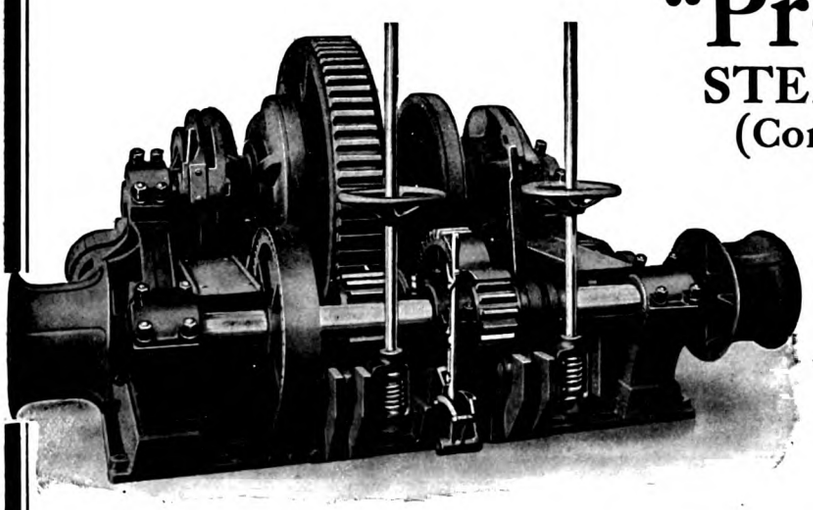

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Are Known Throughout the World for Their Accuracy and Durability

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THE LATEST TESTIMONIAL

ONE of Walker's Cherub II Ship-Logs was used on the motor ship "Jutlandia" in her voyage to the East. The following figures, taken from the engine room "rough book," speak for themselves:

Days Run by Observation	Log
249	249
283	278
266	277
274	278
279	276
284	270
258	270
288	282
244	248
268	278
262	268
Average 268.7	270.37
Knots.. 11.2	11.26

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Brilliant and steady illumination ~ Economical and reliable in operation

PINTSCH GAS LIGHTED BUOYS

BURN CONTINUOUSLY

from 80 to 365 days and nights without attention and can be seen at a distance of six miles. Over 2,200 gas buoys and gas beacons in service. ~ Adopted by the English, German, French, Russian and United States Light House Departments for Channel and Harbor Lighting.

Controlled by the

SAFETY CAR HEATING & LIGHTING COMPANY
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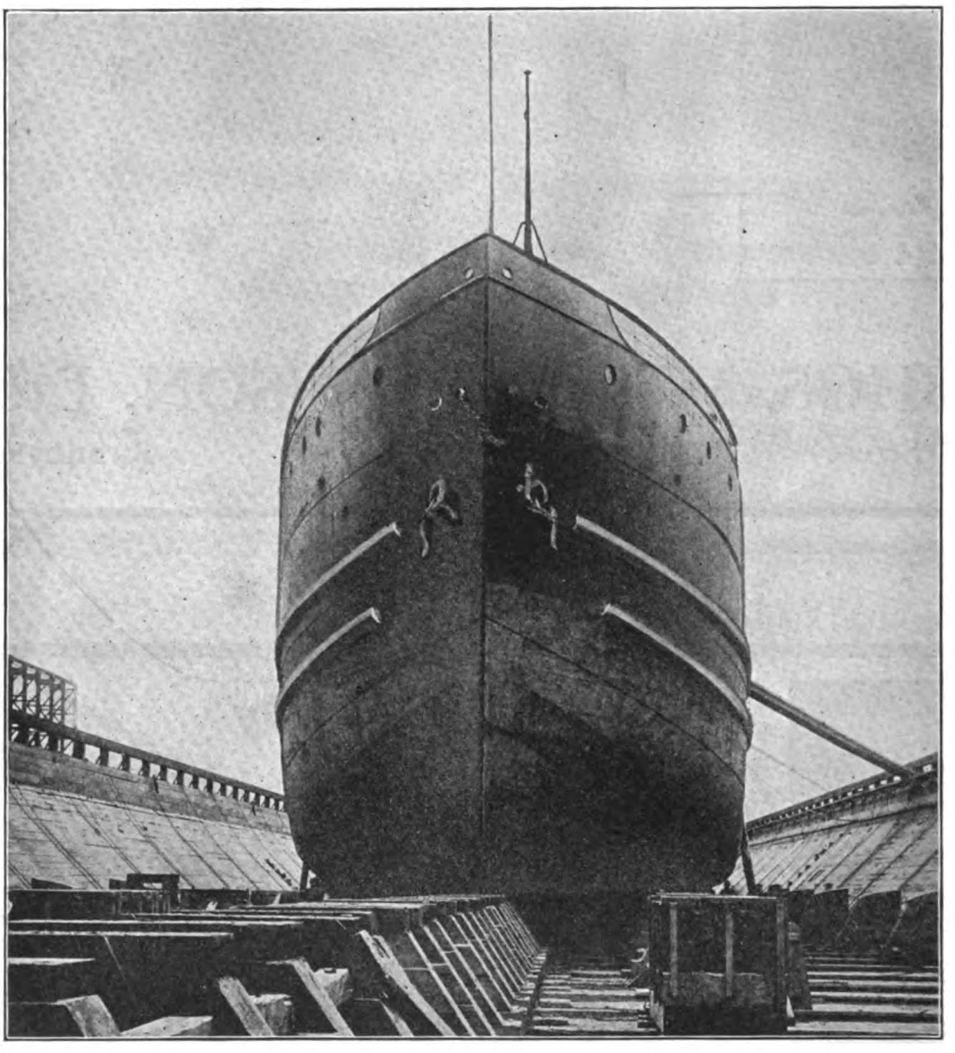

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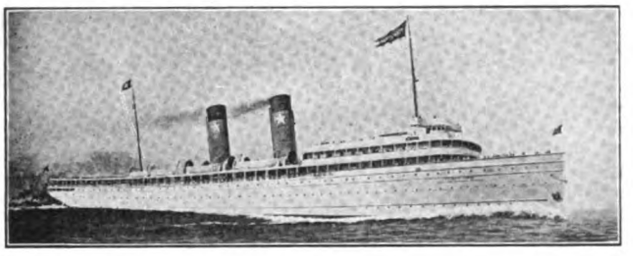

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Marine and Stationary Engines **STEEL SHIPS** Boilers and Auxiliary Machinery

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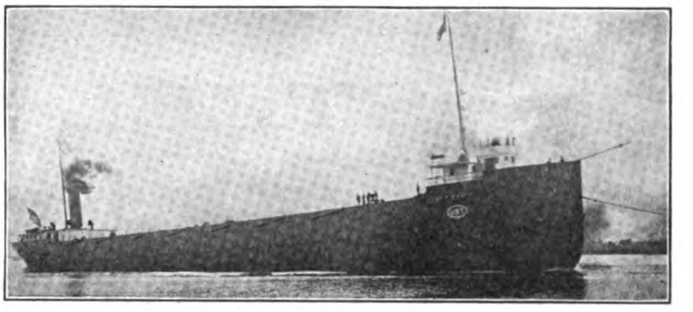

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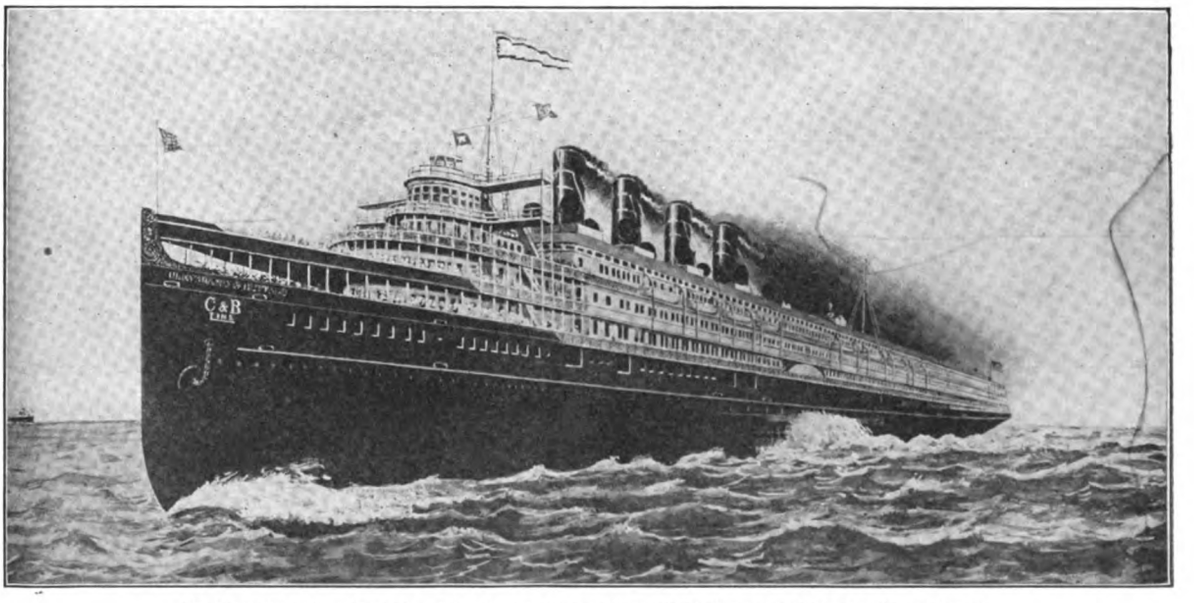
Established 1852



BUILDERS OF "SEEANDBEE," LARGEST SIDE WHEEL STEAMER IN THE WORLD.

Designers and builders of all types of

Freight and Passenger Steamers, Engines, Boilers and Auxiliary Machinery

Manufacturers of BRASS MARINE HARDWARE and BRASS SPECIALTIES.
Builders of **Metallic Life Boats** and **Clark Patent Metallic Life Rafts.**

Steel Shipbuilding Plant at Wyandotte, Michigan.
First-class equipment for making hull and machinery repairs.

Dry Docks, Machinery Works, and General Offices, foot of Orleans Street, **DETROIT, MICH.**

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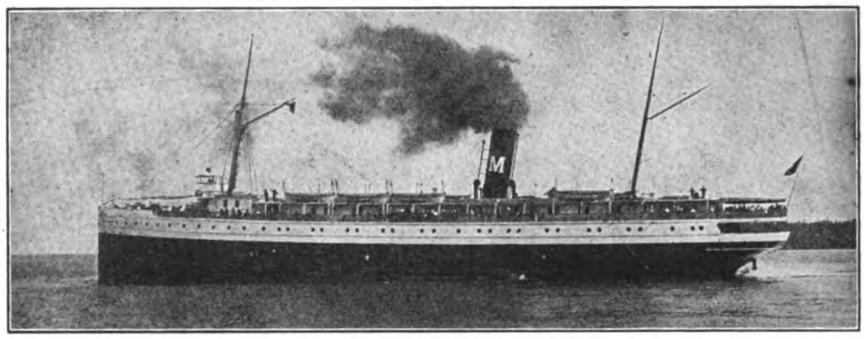
Chicago Ship Building Company



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The Superior Ship Building Company

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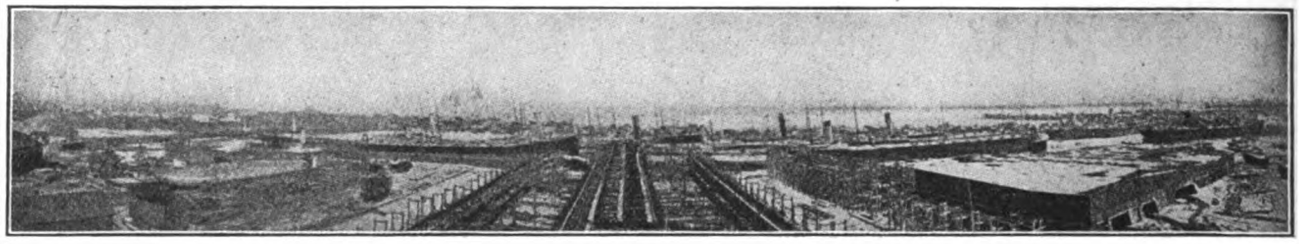

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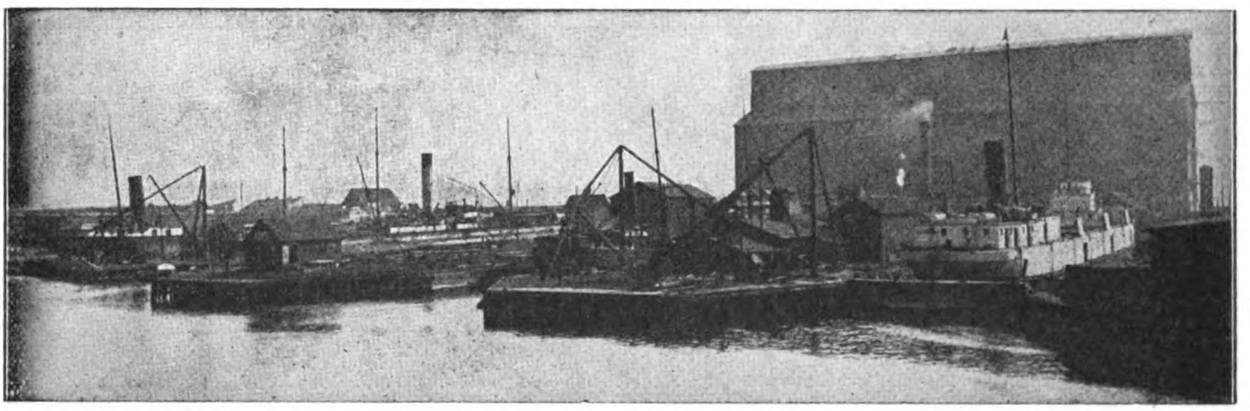

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With our excellent equipment we are enabled to do all kinds of ship repairs at reasonable cost to the owners, whose patronage is solicited with the guarantee of satisfaction in all particulars.

We call attention to our facilities for the construction of new vessels of all kinds, particularly dredging outfits, tugs, scows, fuel lighters, etc., plans for which we will furnish on application together with specifications and estimates of cost.

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Milwaukee Dry Dock Company

MILWAUKEE WISCONSIN

SHIP REPAIRS
OF ALL KINDS

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MAIN OFFICE AT SOUTH YARD
Foot of Washington Street
Telephone Main 3

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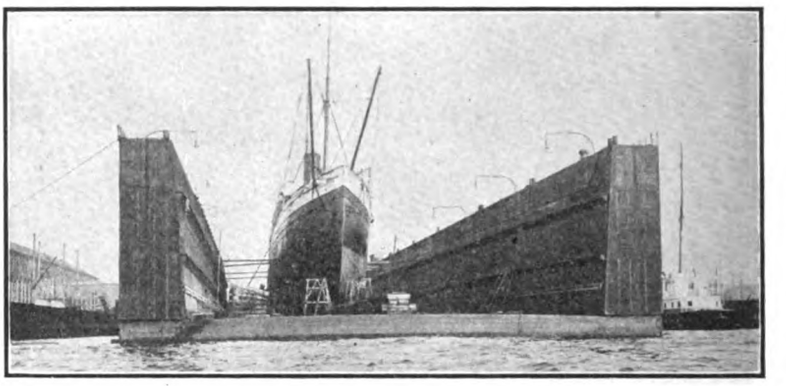

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SEATTLE, WASHINGTON

Thoroughly Complete Ship Repair Plant

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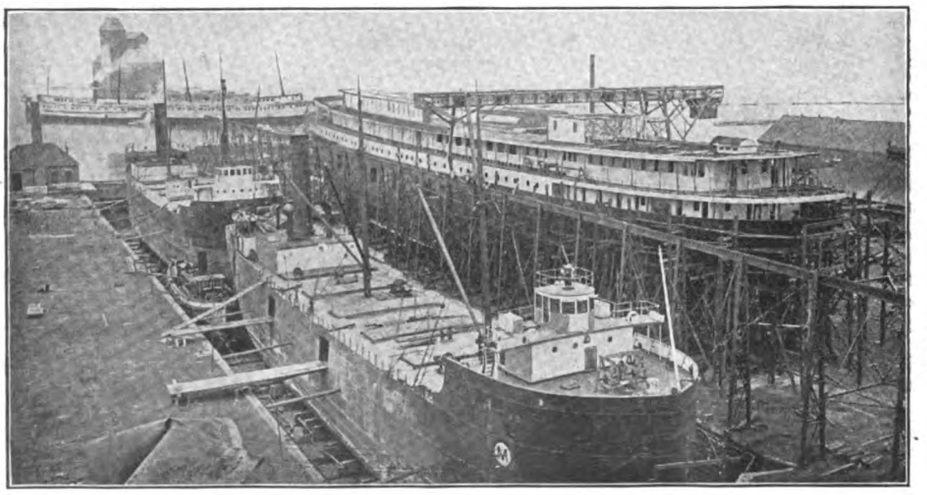

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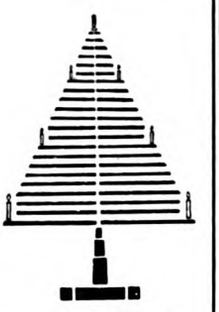
The "Eckliff" Purifier and Circulator —For Scotch Marine Boilers

We Extend to You Our Sincere Good Wishes for A Glad Christmas and a Prosperous New Year

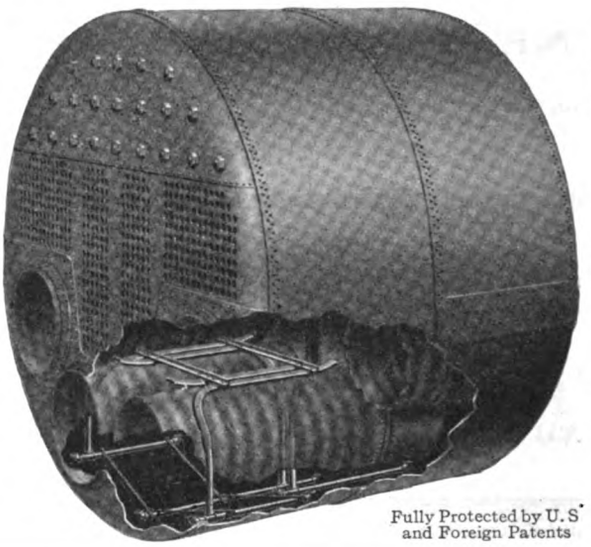


Besides making possible increased speed with decreased fuel consumption, the "Eckliff" Purifier and Circulator keeps the boilers perfectly *clean all the time* by simply opening a valve once every eight or ten hours.

In a recent installation here on the lakes the "Eckliff" Purifier and Circulator *raised 160 pounds steam pressure from cold water in 45 minutes,* and at the same time *maintained* equal temperatures at *top* and *bottom* of the boiler. You can have the same results in *your* boilers. Send for evidence.

Its Installation insures these results:

No more boiler cleaning.
Equalization of temperatures throughout the boiler.
Inactive water filament removed from the hot surfaces.
Thermal efficiency of the boiler increased.
Great fuel saving effected.
Scale formation minimized.
Pitting, grooving, furrowing, furnace cracking and breaking stay-bolts entirely eliminated.
Leaky girth seams stopped at once. Elimination of weakening and destructive molecular changes in the steel of the boiler due to temperature changes.



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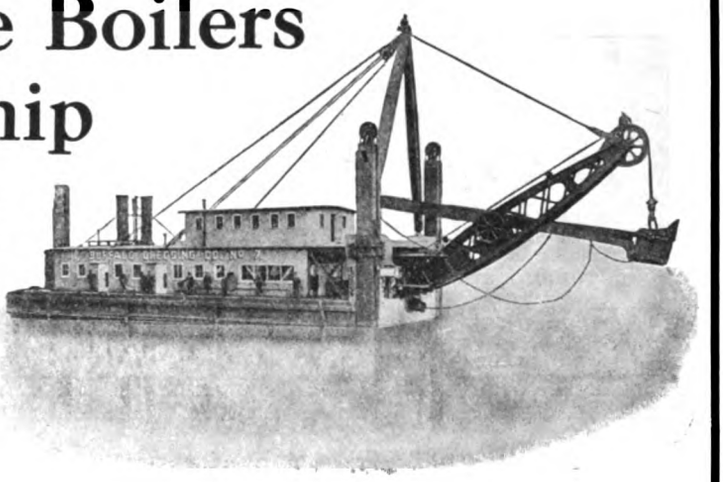
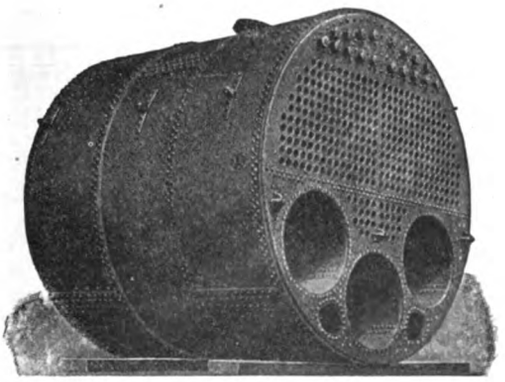
Have you received your copy of the Eckliff Booklet? All Marine Engineers and Boat Owners need it. Better send for it today.

Eckliff Automatic Boiler Circulator Co.
56 Shelby Street
DETROIT MICHIGAN
128

Modern Marine Boilers and Steel Ship Building





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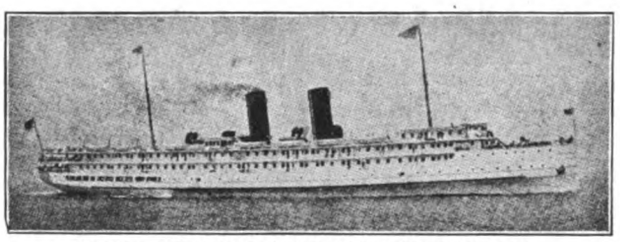

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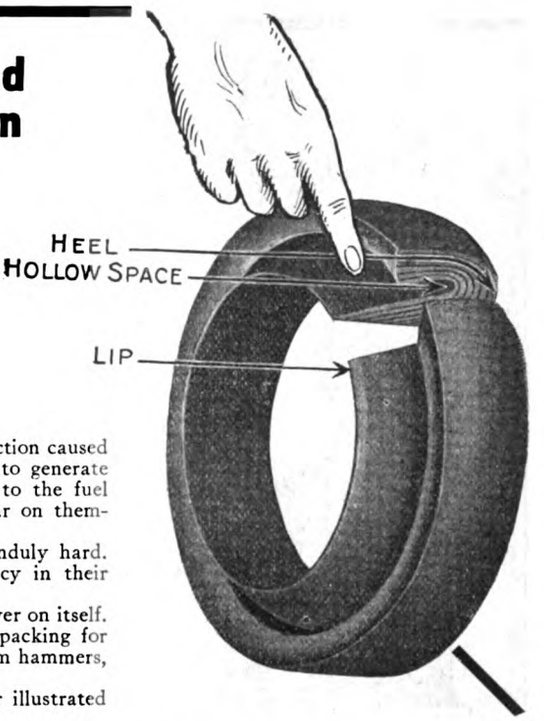
This Lip Prevents Leakage---and Practically Eliminates Rod Friction

J-M Sea Rings are so constructed that the steam or other pressure behind the ring *prevents its own* leakage. In every ring there is a hollow space between the "lip" and the "heel" (see cut) into which the steam or contents of the cylinder flows, forcing the "lip" against the rod with *just sufficient* pressure to prevent leakage past the packing. When there is no pressure on J-M Sea Rings they do not press against the rod. So, unlike ordinary soft packings, on the forward stroke of an engine they create no rod friction, and on the return stroke reduce the friction 50%.



J-M SEA RINGS

on account of their automatic operation, actually eliminate 75% of the rod friction caused by ordinary packing. This effects a proportionate saving in coal necessary to generate steam or extra power required to overcome rod friction. And, in addition to the fuel saving, they increase the efficiency of the engine and eliminate unnecessary wear on themselves and on the rod.

J-M Sea Rings are durable, self lubricating and never become soft or unduly hard. They are simple, easily applied and guaranteed to give the highest efficiency in their respective uses.

J-M Sea Rings are made of a laminated wedge of Asbestos, or duck, turned over on itself. They withstand highest pressures and temperatures, and are the ideal rod packing for superheated or saturated steam, high pressure hydraulics, marine engines, steam hammers, hot or cold water pumps, air compressors, etc.

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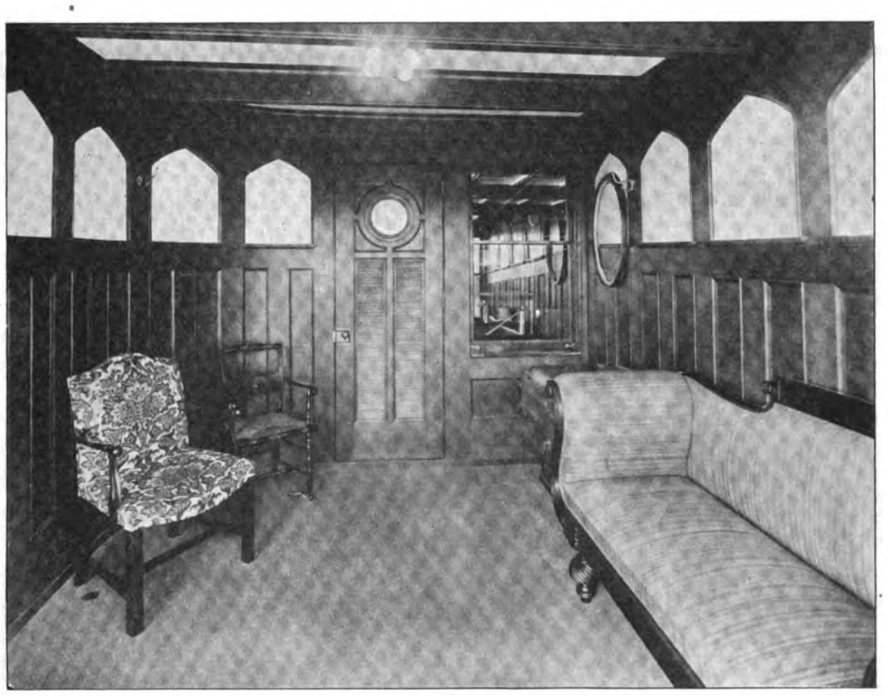

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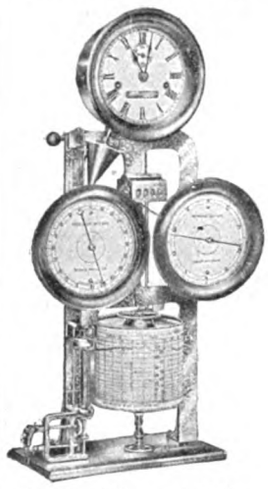

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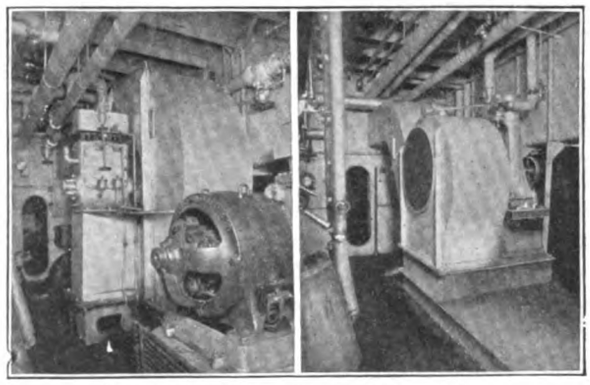

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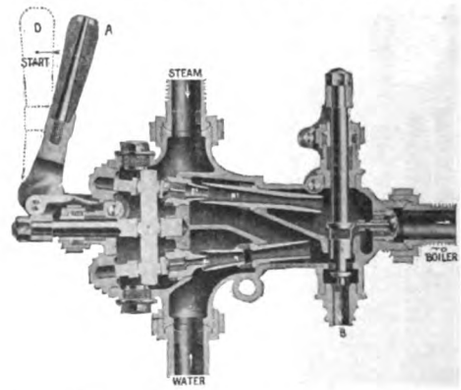

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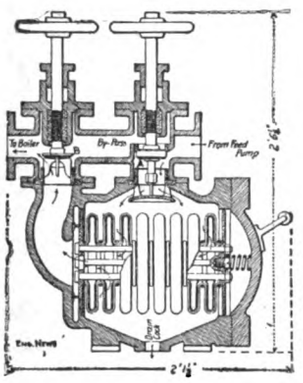

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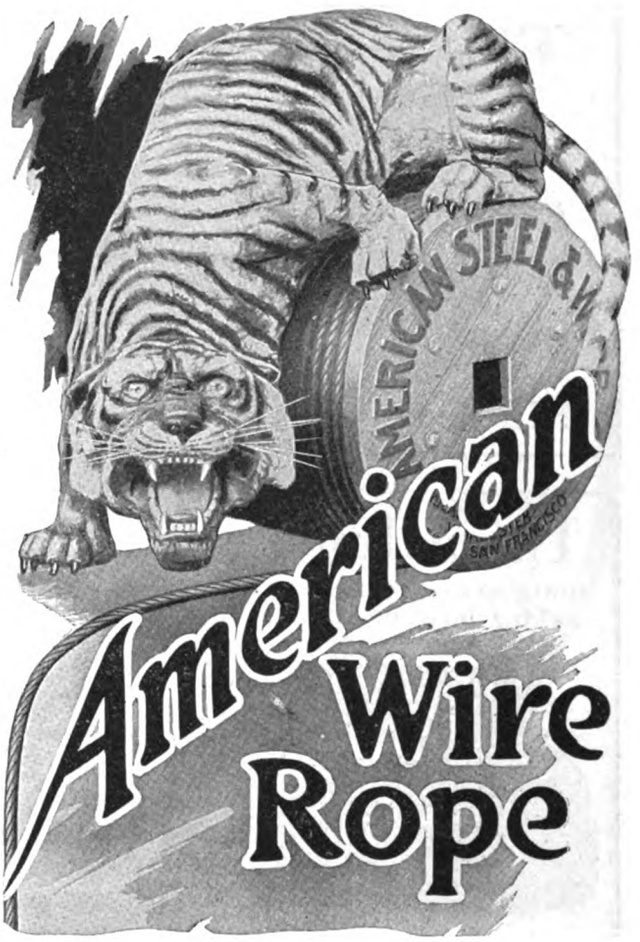

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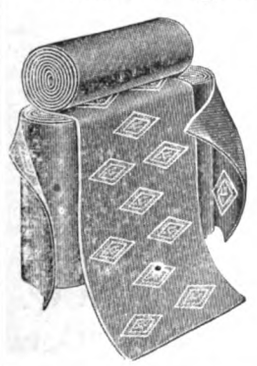

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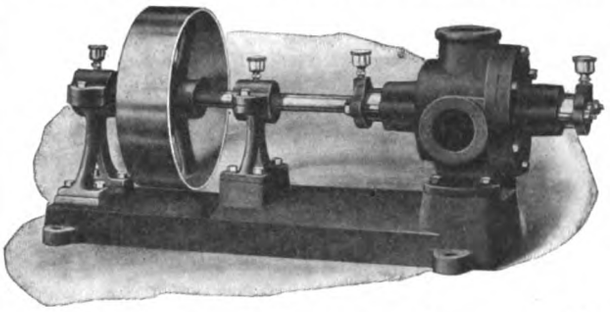

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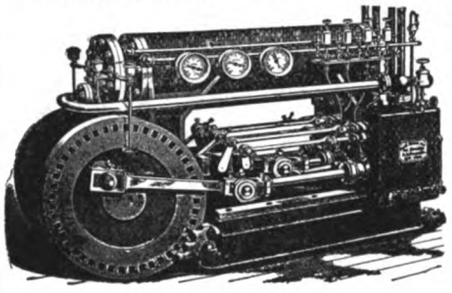

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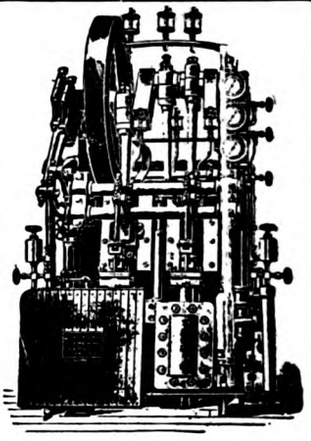

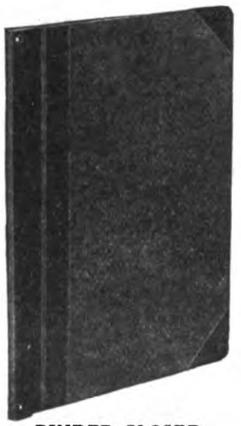

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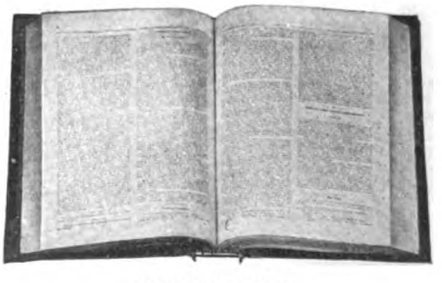

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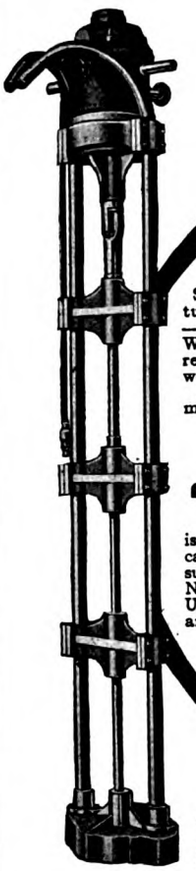

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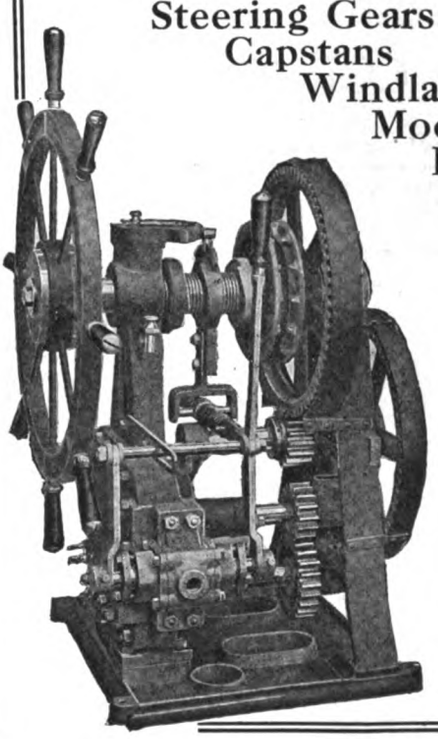

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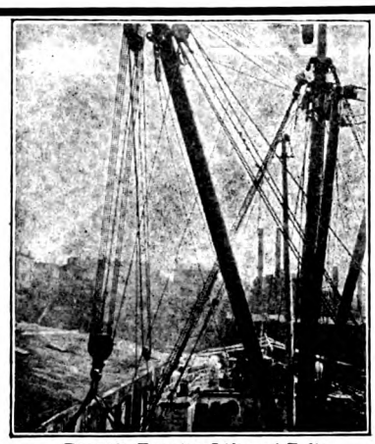

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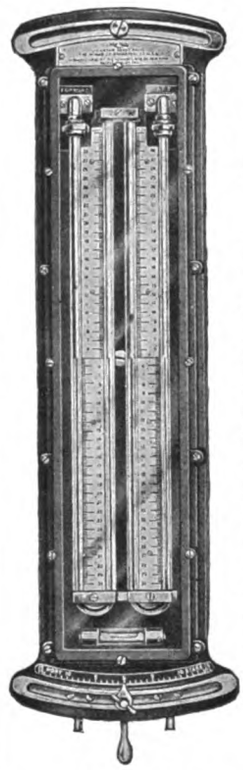

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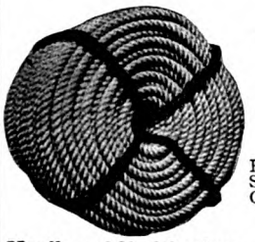

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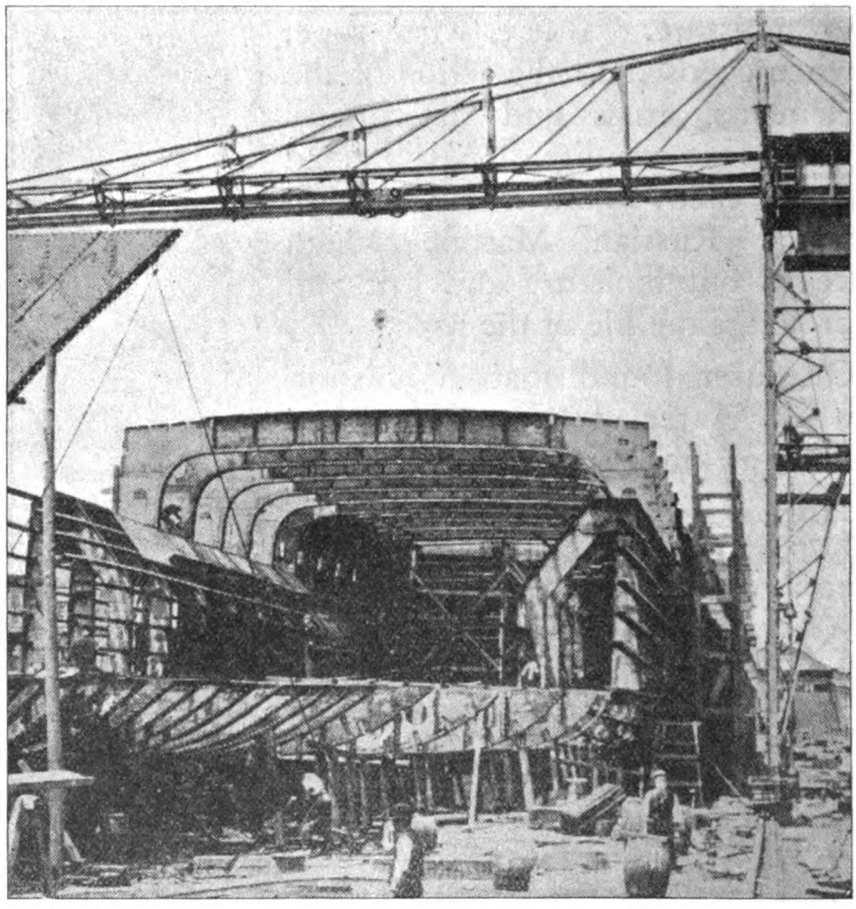

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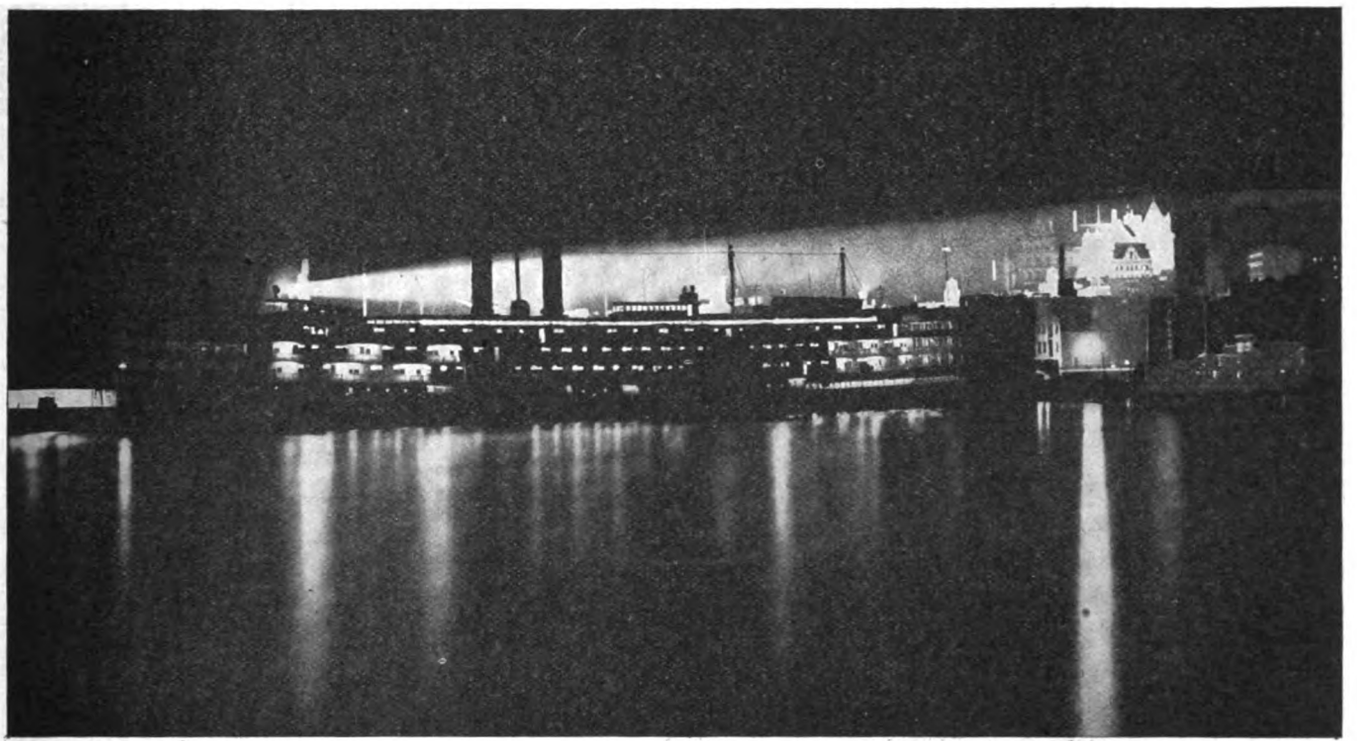

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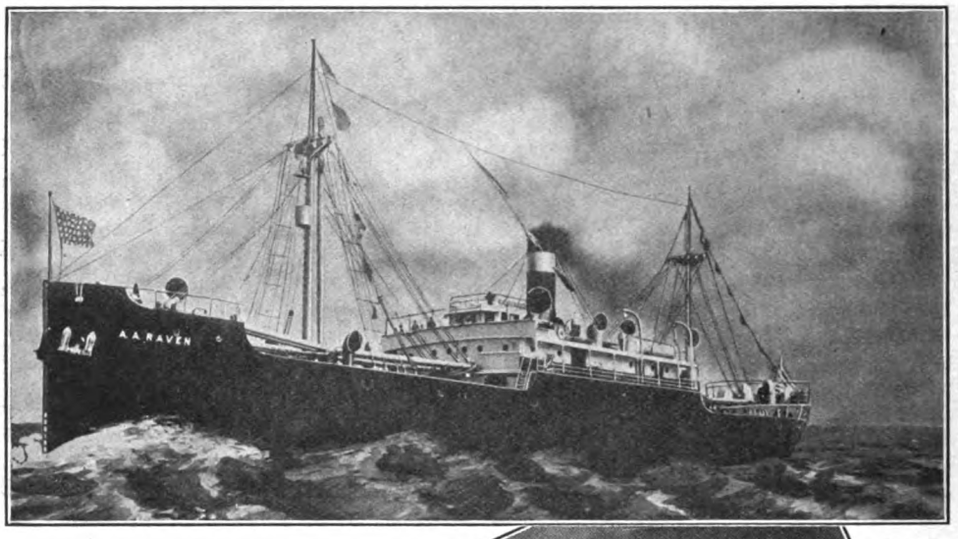

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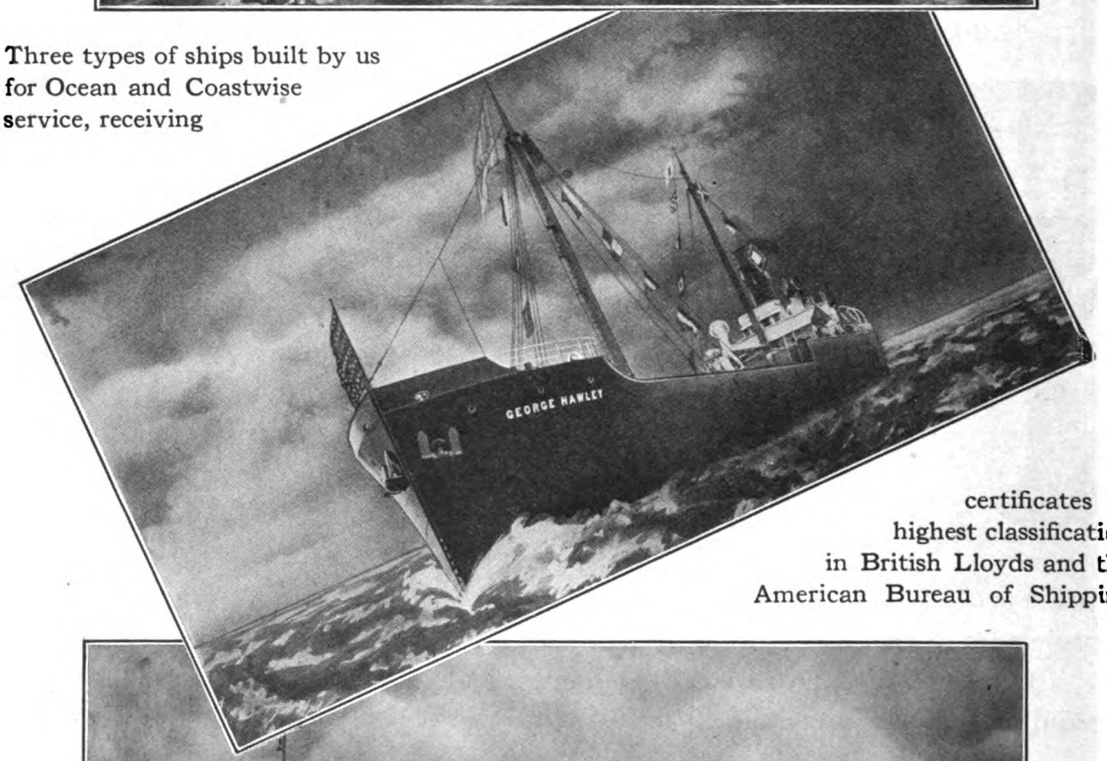

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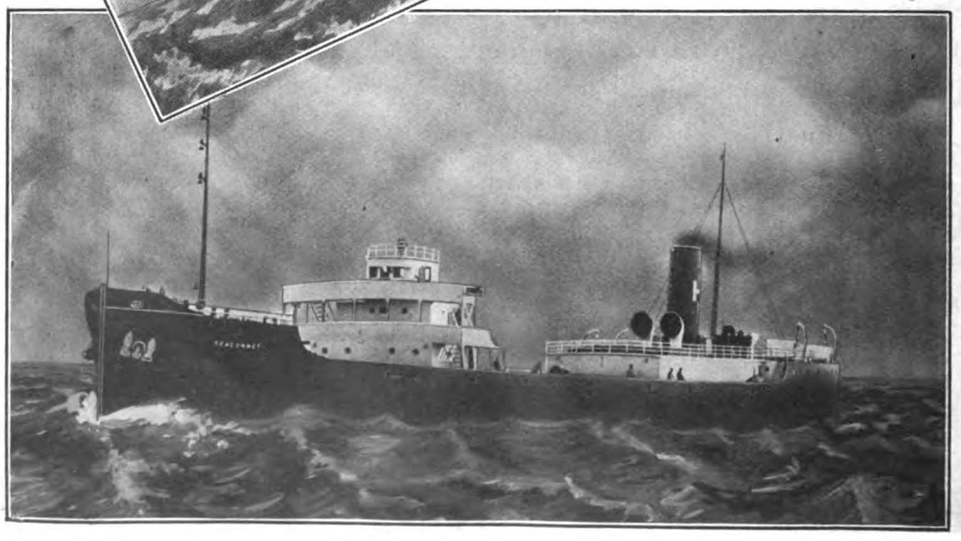

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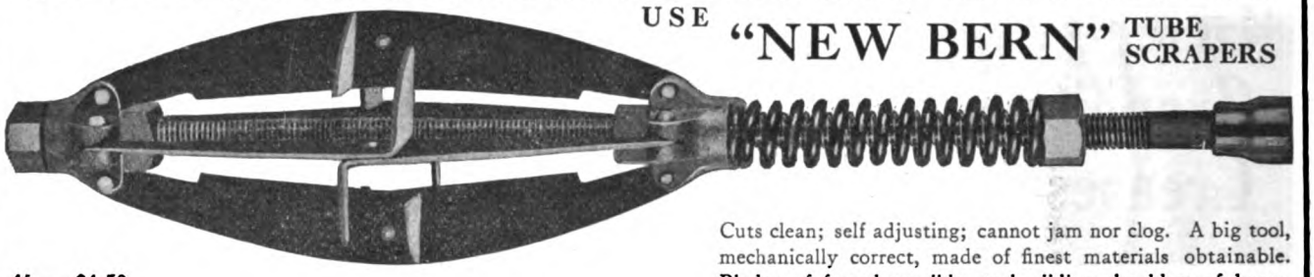

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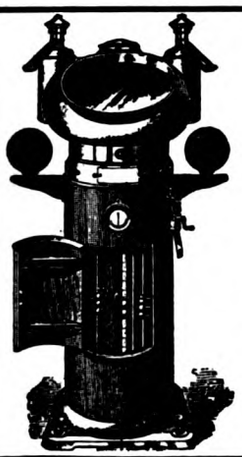

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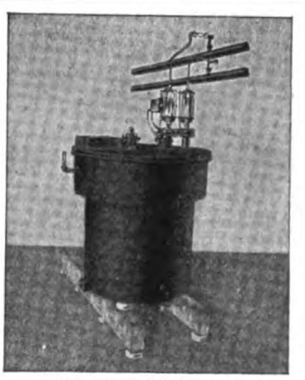

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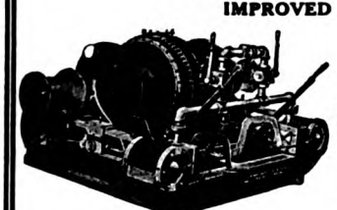

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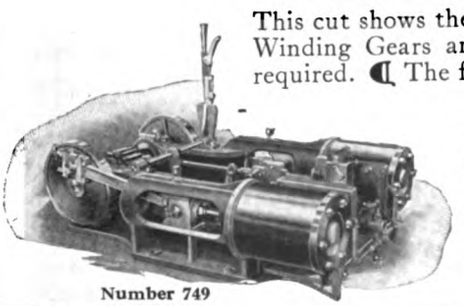

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Dake Engine Co.
General Electric Co.

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HOISTS.—(Electric.)
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International Oxygen Co.

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Electro Dynamic Co.
McNab Co.

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American Speed Indicator Co.
Electro Dynamic Co.
McNab Co.

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American Speed Indicator Co.
McNab Co.

INDICATORS.—(Speed.)
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Penberthy Injector Co.
Schutte & Koerting Co.

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Federal Graphite Mill Co.

LUBRICANTS.
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Federal Graphite Mill Co.

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MOTORS.—(Winch.)
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Chicago Ship Building Co.
Collingwood Ship Building Co.
Detroit Ship Building Co.
Fletcher Co., W. & A.
Fore River Ship Building Corp.
Great Lakes Engrg. Works
Isherwood, J. W.
Johnston Bros.
Manitowoc Ship Building & Dry Dock Co.
Milwaukee Dry Dock Co.
Seattle Const. & Dry Dock Co.
Superior Ship Building Co.
Tietjen & Lang Dry Dock Co.
Toledo Ship Building Co.

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American Speed Indicator Co.

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Ross Valve Mfg. Co.

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Morse & Son, Inc., Andrew

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Furstenau, M. C.
Hunt & Co., Robert W.
Hynd, Alexander

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General Electric Co.

TANKS.
Bath Iron Works

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Furstenau, M. C.
Hunt & Co., Robert W.
Hynd, Alexander

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Martin-Barriss Co.

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Waterbury Co.

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Waterbury Co.

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Bath Iron Works

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Bath Iron Works
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Penberthy Injector Co.
Ross Valve Mfg. Co.

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Ashton Valve Co.
Ross Valve Mfg. Co.

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Roelker, H. B.
Sheriffs Mfg. Co.
Superior Ship Building Co.
Toledo Ship Building Co.
Trout, H. G.

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Chase Machine Co.
Hyde Windlass Co.
Lidgerwood Mfg. Co.

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Great Lakes Dredge & Dock Co.
Starke Dredge & Dock Co., C. H.
Sullivan, M.

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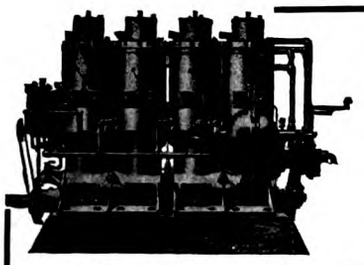

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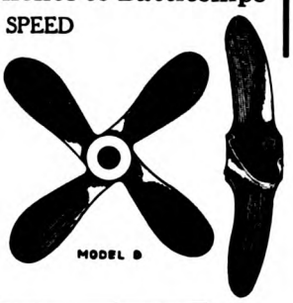

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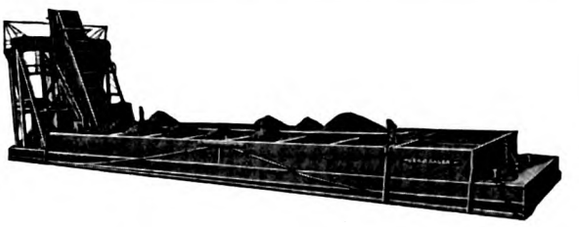

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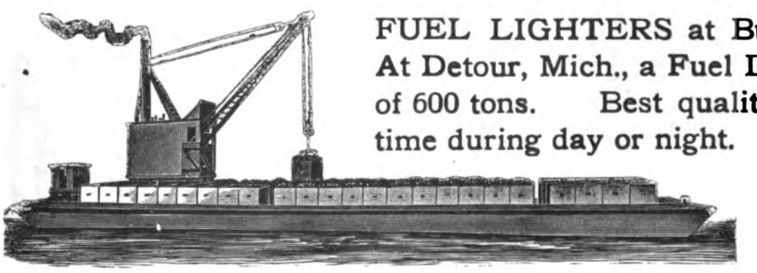

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SHIP AND ENGINE INSPECTOR IS open for engagement. English certificate. Sea and surveying experience. Would accept assistant's position. Box 65, THE MARINE REVIEW, Cleveland, O.

WANTED TO BUY TWO TOW BARGES to be used for storing contractors' machinery, or a dismantled barge of any kind. Address Capt. Frank Bloomer, Birge building, Buffalo.

WANTED—POSITION, SUPERINTENDing engineer and designer, steam or oil engines, land or marine; best references. Box 70, THE MARINE REVIEW, Cleveland, O.

U. S. ENGINEER OFFICE, LITTLE Rock, Ark., Nov. 14, 1913. Sealed proposals for constructing and delivering pontoons and pipe lines for Dredges H. S. Taber and Robert McGregor will be received at this office until 11 a. m., Monday, Dec. 15, 1913, and then publicly opened. Information on application. A. B. Putnam, Capt., Engrs.

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FOR SALE:—ONE SIDEWHEEL RIVer boat Mitchelle C., built in the year 1905, of steel, sharp head, register length 100 ft., register breadth 20 ft., and register depth 5 ft., carries 85 tons freight, and 300 passengers, fastest and best equipped of any steamer doing service on the Waccamaw river. Price and specifications submitted on application. James R. Holbert, secretary and treasurer, Conway, S. C.

FOR SALE:—LOCOMOTIVE CRANES, McMyler revolving derricks, with clam shells. The Cleveland & Erie Machinery Co., Rockefeller Bldg., Cleveland, O.

FOR SALE: — STEAMER "SEARCHlight". 95 ft. long, 19 ft. beam, 6 ft. depth of hold. This steamer has recently received extensive repairs; has been put in first class shape and inspected by the U. S. inspectors. Will be sold very cheap; can be used as fishing tug, small freight boat or could be made into a passenger boat. Address W. D. Hamilton, 2431 S. Lincoln St., Chicago, Ill.

FOR SALE:—TWO SCOTCH MARINE boilers. Now on the dock of The Great Lakes Engineering Works, at Ecorse. These boilers are about 13 ft. diameter and length and were allowed 125 lbs. steam when last inspected. Write O. W. Blodgett, Duluth, Minn.

FOR SALE: — PATENT REVOLVING watertight door. Improvements recently allowed. Foreign patent privileges. Designed after the ordinary plug cock. Keeps the bulkheads intact as the door is always in a closed position. Price will be reasonable. Address "Door", in care of THE MARINE REVIEW, Cleveland, O.

FOR SALE.—SCHOONER J. H. MEAD, built in 1874. Net tonnage 388, length 171 ft.; beam 29 ft. I have spent on her the last two years, $6,500, which includes new topwork, new centerboard box, partly new keelson, new boiler and winch and pump, and all new sails. Carries 400 M. hardwood, 500 M. pine. Price reasonable. For further particulars address Capt. A. Thompsen, 3706 McLean avenue, Chicago, Ill.

FOR SALE CHEAP. CANADIAN REGistered passenger steamer. 200 gross tons. Rating 90. New Scotch boiler. Hull in good repair. Can be seen at Sandusky. Address Capt. J. W. Post, Chatham, Ont., or Sandusky, O.

FOR SALE:—STR. ROBT. MILLS. CAN be examined at Manitowoc, Wis. Carries 2,700 tons. Address O. G. & D. H. Donaldson, 50 S. Division St., Buffalo, N. Y.

FREIGHT STEAMER VERMILLION for sale. Length overall 265 ft. 10 in.; 42 ft. beam, 22 ft. deep, 1,827 gross tons register.

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1—7 in. x 7 in. x 8 in. duplex ballast pump with 6 in. suction.
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RECEIVER'S SALE: — PURSUANT TO order of the United States District Court, the undersigned hereby offers for sale the following equipment of the Standard Contracting Co., now located at Sailor's Encampment, Mich., to wit: Three drill scows and equipment, one derrick schooner, one derrick scow, one coal scow, one dipper dredge and equipment, two tugs, together with blacksmith outfit, flues, plates, round iron, new pipe, bar iron, steel bars, etc. Also miscellaneous stock of oak timber, gear wheels and hawsers. There is also offered for sale additional property of The Standard Contracting Co., located at Cleveland, consisting of dredges, tugs, scows, contractors' equipment and supplies of various kinds. This property can be seen at Sailor's Encampment and Cleveland. Information will be furnished upon request. James H. Cassidy, as receiver of The Standard Contracting Co., 1019 Williamson building, Cleveland, O.

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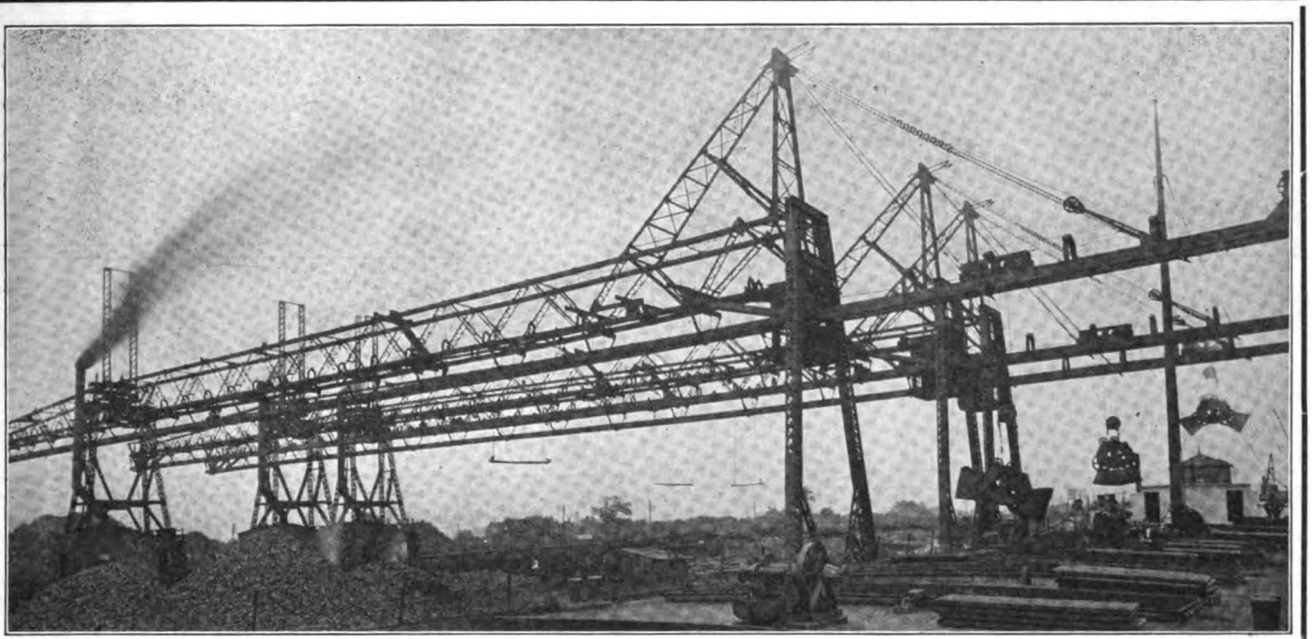

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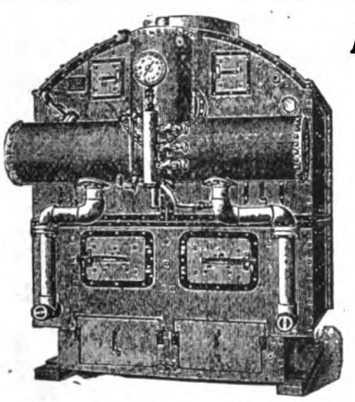

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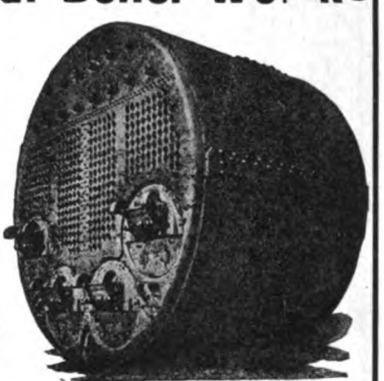

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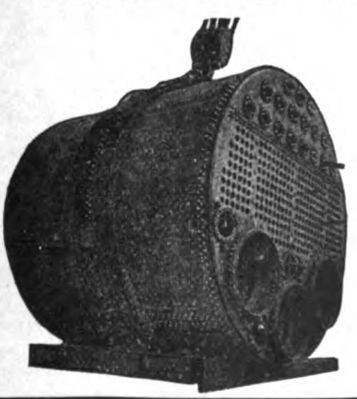

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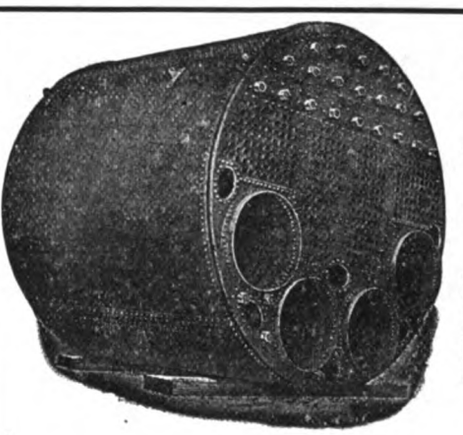

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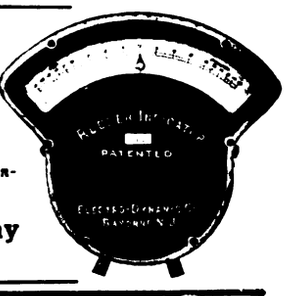

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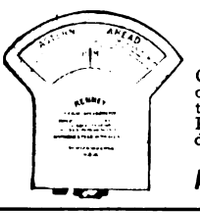

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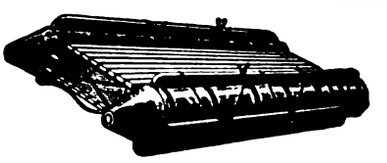

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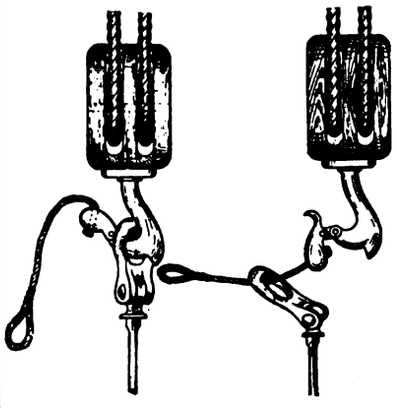

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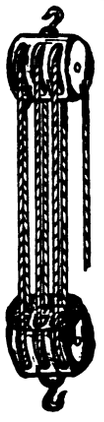

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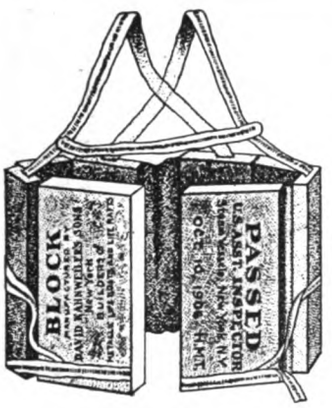

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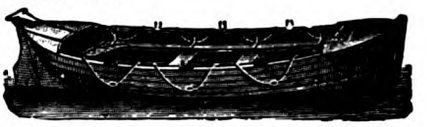

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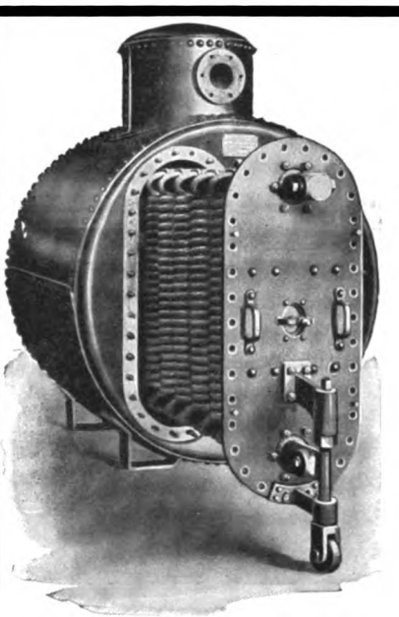

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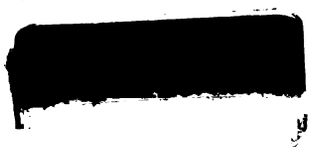

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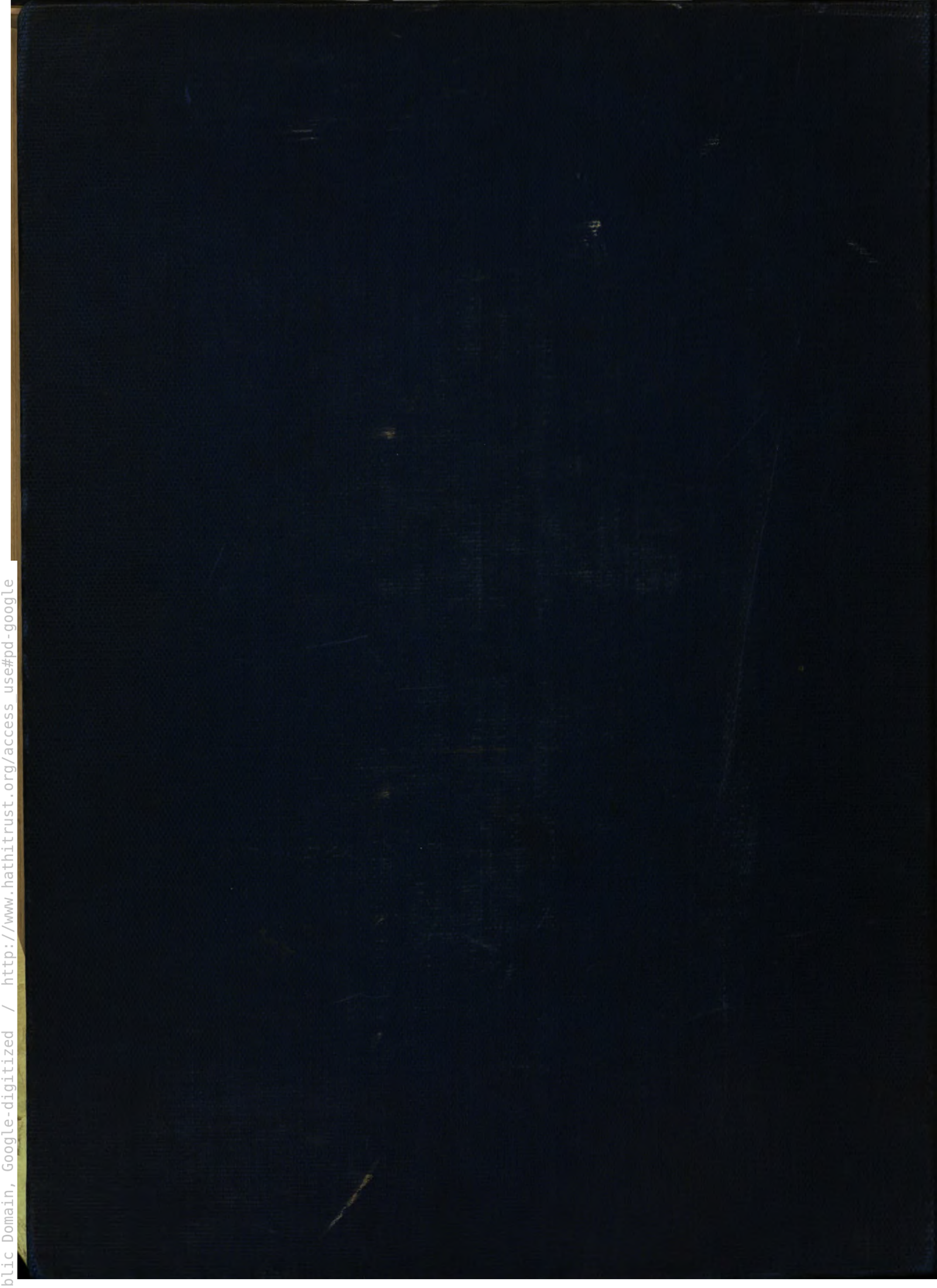

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